REVISION OF THE NORTH AMERICAN MOTHS OF THE SUBFAMILIES LASPEYRESIINAE AND OLETHREUTINAE

By Carl Heinrich

Of The Bureau of Entomology, United States Department of Agriculture.

INTRODUCTION

This paper is a continuation of the revisionary work of the family Olethreutidae, begun in United States National Museum Bulletin 123,[1] and treats of the two remaining subfamilies, Laspeyresiinae and Olethreutinae. It is based chiefly upon the collections of the United States National Museum,[2] the American Museum of Natural History, the Canadian Department of Agriculture, and of Dr. William Barnes, of Decatur, Ill. In addition I have examined the types of the Museum of Comparative Zoology and the Philadelphia Academy of Sciences. I have also received considerable material from E. H. Blackmore and Dr. W. T. M. Forbes, and Dr. J. McDunnough has kindly loaned the genitalia slides of his types.

The classification here proposed follows that of my revision of the Eucosminae and the method of treatment of genera and species is the same except that characters of the female genitalia are included and a drawing of these organs given for every species of of which a female could be secured. For those species common to Europe and North America purely European synonymy is omitted. Otherwise generic and specific synonymy is given as fully as possible and, except where so noted in the text, has been verified by comparison with types or other authentic specimens. In each case the more important systematic references are given; and for species of economic importance, citations to the papers giving the fullest accounts of life history, distribution, and control.

Under the heading Distribution are given (unless otherwise stated in the text) only the localities by States of the specimens which I have examined and which are now in the National, Canadian

[1] Revision of the North American Moths of the Subfamily Eucosminae of the Family Olethreutidae, by Carl Heinrich, 1923.

[2] Including the Fernald collection recently purchased by the United States Bureau of Entomology and now incorporated in the national collection.

National, American Museum, and Barnes collections. Published records which I have been unable to verify are omitted.

Food plant records are also given for each species, where known. When such references are omitted the food plant is presumed to be unknown.

Thirty-five genera, 223 species, and 9 varieties are recognized as belonging to the two subfamilies. Of these, 16 genera, 34 species, and 3 varieties are described as new. Five species now listed in the Olethreutinae, but which must be referred elsewhere, are briefly treated at the end of the paper.

HISTORICAL REVIEW

It is necessary here to call attention to three important works dealing with the family and not mentioned in Bulletin 123. While the latter was in press an extremely interesting paper by F. N. Pierce and J. W. Metcalfe[3] appeared, figuring the male and female genitalia of the British Tortricoidea, describing these organs in detail and proposing a classification for the group upon purely genetalic characters. It is a valuable work and I would acknowledge my indebtedness to it. Unfortunately the authors ignored all other characters of the insect except genitalia and as a result have made some unnatural groupings. In the Olethreutidae they make six group divisions corresponding roughly to our three subfamilies, as follows: Their Olethreutidii to our Olethreutinae; Ancylisidii and Epiblemidii to part of the Eucosminae; Lipoptychidii to part of the Laspeyresiinae; and their Ephippiphoridii (a heterogenous group) to the remaining genera and species of our Eucosminae and Laspeyresiinae. Their divisions are made entirely upon the form and number of the signa of the female bursa, characters of generic rather than subfamily value, and which do not hold even for the groups as they define them. Thorn-like signa are found in the Laspeyresiinae, Olethreutinae, and Eucosminae (Epiblimidii); and the transitions from pocket to thorn-like and from thorn-like to "pilleate" shapes are gradual and nowhere clearly marked except between species or, at most, genera.

Recently Dr. W. T. M. Forbes[4] has published a handbook of The Lepidoptera of New York and Neighboring States, with generic and specific keys and descriptions of the species occurring in the Northeastern United States. In this the Olethreutidae are treated as a subfamily of the Tortricidae. Most of the genera defined in my Revision of the Eucosminae are retained and the classification there proposed is more or less followed. The general treatment of the Tor-

[3] Genitalia of the group Tortricidae of the Lepidoptera of the British Islands, 1922, 34 pls., 101 pp.

[4] Cornell Univ. Agric. Exp. Sta., Memoir 68, 1924, pp. 376–476.

tricoidea, however, is eclectic and the classification incorporates the systems of several authors.

Kennel's monograph of the European Tortricoidea,[5] mention of which was unfortunately omitted from Bulletin 123, deals only with such American species as are common to the two continents. It is an elaborate work with full specific descriptions and fine color figures of the moths. There is a detailed discussion of phylogeny and structural characters and numerous figures of the latter, but no keys specific or other. The genitalia receive only occasional mention and the classification departs but little from the Heinemann system.

CLASSIFICATION

In as much as a full family description and a key to the subfamilies are given in Bulletin 123, it will be necessary here to note only a few emendations. In my definition of the family I described vein 2 of fore wing as "from the cell before outer three-fourths." This character holds for all the American species except *hemidesma* Zeller which I am making the type of a new genus (*Evora*). Here 2 comes from cell well beyond three-fourths as in the Phaloniidae. On genetalic and other characters, however, *Evora* is a perfectly good Olethreutid and goes in the Olethreutinae. Absence of the pecten on the lower median vein of hind wing should also be noted in three genera of the Laspeyresiinae (*Goditha*, *Satronia*, and *Sereda*). In males of the laspeyresiin genera *Hemimene* and *Balbis* vein 8 of hind wing is not free, but either fuses with 7 beyond cell (*Hemimene*) or (in *Blabis*) anastomoses with it from slightly beyond base to well beyond cell, somewhat as in the Pyralidae. Such exceptions make it practically impossible to frame a definition that will hold throughout for the family unless we include characters of the male genitalia. On these organs, however, the definition is clear-cut and permits of no confusion. The Olethreutidae is a natural, well-marked family, much easier to recognize than to describe in categorical terms.

The subfamilies also appear to be natural groups, in the main clearly defined on hind wing venation; though here it is also necessary to note a few exceptions. Some of the genera (*Pseudogalleria* in the Eucosminae, *Endothenia*, *Esia*, and *Episimus* in the Olethreutinae, and *Gymnandrosama* and *Ecdytolopha* in the Laspeyresiinae) are obviously transitional and on some of their characters could go in other groups. *Pseudogalleria* has the reduced genetalia of the Laspeyresiinae and the hind wing venation of the Eucosminae. On the sum of its characters it seems to go better in the latter subfamily than elsewhere. Another genus of the Eucosminae (*Gwendolina*) has veins 3 and 4 of hind wing connate and 5 approximate to 4 at base,

[5] Die Palaearktischen Tortriciden, Zoologica, Heft 54, vol. 21, Lfg. 1–4, 1908–1918.

characters which would place it in the Olethreutinae did not genitalia and the notched termen of fore wing show its clear relationship to the *Epinotia* group of the Eucosminae. In the Olethreutinae, *Endothenia*, and *Esia* exhibit the venational characters of the Laspeyresiiae (vein 5 or hind wing parallel to 4). They also have the general habitus of the latter; but the genitalia are typically Olethreutin, *Endothenia* having a strongly developed uncus (not found in Laspeyresiinae), and both genera, the heavy spine cluster on sacculus of harpe typical of the Olethreutiinae. *Endothenia* forms (with *Gymnandrosma* and *Ecdytolopha* in the Laspeyresiinae) the connecting link between the two subfamilies. *Episimus*, which is here referred to the Olethreutinae might go, on the other hand, as easily into the Eucosminae were it not for the normally connate condition of veins 3 and 4 of hind wing. Both the subfamilies Laspeyresiinae and Eucosminae seem to be derived directly from the Olethreutinae which appears to be the primitive group of the family.

The trees shown on pages 7 and 77 illustrate my conception of the relations and phylogeny of the genera of the two groups here treated, and the tables opposite pages 6 and 76 give comparative analyses of the various structural characters upon which the genera are classified. It will be necessary here only to expand the original key to the subfamilies[6] by a brief summary of the characters distinguishing them.

CHARACTERS OF THE SUBFAMILIES OF OLETHREUTIDAE

Olethreutinae.—Hind wing normally with vein 5 bent at base and approximate to 4, veins 3 and 4 connate. (Where 5 is straight and parallel with 4, harpe of male genitalia has at least one strong spine cluster (*Spc*[1]) always present; and where 3 and 4 are stalked (*Episimus tyrius*) there are long flat spines on base of sacculus). Thorax normally with strong posterior tuft (absent only in *Episimus and Bactra*). Fore wing with termen normally convex, rarely concave (*Episimus*) and never notched; no costal fold in male. Male genitalia with uncus normally present and well developed, usually simple; socii usually well developed; harpe with at least one and frequently two strong spine tufts (*Spc*[1], *Spc*[2]) from or near sacculus; cuculli usually narrowly elongate; sacculus often with strong basal spining (*ScSp*).

Eucosminae.—Hind wing with vein 5 always somewhat bent and approximate to 4 at base; veins 3 and 4 stalked or united (connate only in *Gwendolina* where termen of fore wing is notched, and sacculus of harpe is haired but without strong spine cluster). Thorax seldom with posterior tuft. Fore wing with termen convex, con-

[6] Bull. U. S. Nat. Mus. 123, p. 10, 1923.

cave or notched; often with costal fold in male. Male genitalia with uncus present or absent, when present simple, bifid or bifurcate; socii usually well developed; harpe rarely with strong spine tufts on or near sacculus; cucullus usually rather broad in proportion to its length, sometimes (in *Epinotia* and allied genera) narrowly elongate; sacculus smooth at base or weakly haired.

Laspeyresiinae.—Hind wing with vein 5 always straight and parallel with 4; veins 3 and 4 connate or stalked. Fore wing with termen convex or concave, rarely notched; costal fold usually absent (present in a few species of *Dichrorampha*). Thorax without posterior tuft (except in *Gymnandrosoma*, *Ecdytolopha*, and a few tropical genera). Male genitalia with uncus absent; socii usually absent; harpe simple, without spine clusters on or near sacculus; cucullus rather broad in proportion to its length, very rarely narrowly elongate; sacculus smooth at base or very weakly haired.

In female genitalia there are no definitive subfamily characters. The differences (chiefly in the shape and number of the signa, the shape of the genital plate and the chitinization and curvature of the ductus) are of generic and specific rather than of larger group significance. There is a certain habitus that tells one experienced with the genitalia of the group whether a specimen belongs in one subfamily or another; but it does not seem possible to express this in any satisfactory description.

LARVAL HABITS AND ECONOMIC IMPORTANCE

A variety of larval habits prevail in the two subfamilies. In the Olethreutinae the majority of the species feed externally on the leaves or flowers of trees, shrubs, and low plants, either exposed or as leaf tiers, folders, or rollers. Some are seed feeders in the capsules or fruits and a few are stem or root borers in low plants. In the Laspeyresiinae a larger percentage are internal feeders in fruits, nuts, or seed capsules. Some are stem borers and a goodly number leaf folders.

The latter subfamily contains several of our most important economic insects, notably: The notorious codling moth (*Carpocapsa pomonella*), the oriental peach moth (*Grapholitha molesta*), two other serious fruit pests (*G. packardi* and *G. prunivora*), the pea moth (*Laspeyresia nigricana*), the acorn moth (*Melissopus latiferreanus*), the Robinia gall maker (*Ecadytolopha insiticiana*) and a group of spruce cone moths that do serious damage by the destruction of seeds (*Laspeyresia piperana* and allies).

In the Olethreutinae we have a spruce defoliator of importance (*Taniva albolineana*) and the destructive grape berry moth (*Polychrosis viteana*).

There are several other species in the two subfamilies that are potential enemies of serious import; but the above will serve to indicate the economic importance of the family.

Subfamily LASPEYRESIINAE

KEY TO THE GENERA OF LASPYRESIINAE

1. Thorax with posterior tuft ---- 2.
   Thorax without posterior tuft ---- 3.
2. Male with hind tibia dilated, broadly tufted, and with heavy dorsal hair pencile from base; female with ductus bursae short. (15) **Gymnandrosoma.**
   Male with hind tibia loosely scaled, but otherwise simple, no hair pencile from base; female with ductus bursae long ---- (16) **Ecdytolopha.**
3. Hind wing without pecten on lower median vein ---- 4.
   Hind wing with pecten on lower median vein ---- 6.
4. Hind wing with veins 6 and 7 parallel or subparallel ---- 5.
   Hind wing with veins 6 and 7 approximate toward base (tortriciform). (8) **Sereda.**
5. Hind wing with veins 6 and 7 parallel; fore wing of male with 12 veins. (1) **Goditha.**
   Hind wing with veins 6 and 7 subparallel; fore wing of male with 11 veins. (3) **Satronia.**
6. Hind wing with veins 6 and 7 parallel or subparallel ---- 7.
   Hind wings with veins 6 and 7 approximate toward base (or sometimes in male with 7 running into 8) ---- 10.
7. Hind wing with veins 6 and 7 parallel ---- 8.
   Hind wing with veins 6 and 7 subparallel ---- 9.
8. Male genitalia with socii developed, long, finger like; female with two signa in bursa copulatrix ---- (5) **Talponia.**
   Male genitalia without socii; female with single signum. (2) **Dichrorampha.**
9. Male genitalia with socii developed; female with single signum in bursa. (4) **Ricula.**
   Male genitalia without socii; female with two signa ---- (7) **Ethelgoda.**
10. Head, palpi, legs, and underside of thorax covered with fine long hairs. (12) **Hedulia.**
    Head, palpi, legs, and underside of thorax normally scaled ---- 11.
11. Male with veins 7 and 8 of hind wing fusing beyond cell ---- (6) **Hemimene.**
    Male with vein 8 of hind wing free; 7 approximate to 6 toward base ---- 12.
12. Male with hind tibia dilated and broadly tufted ---- (13) **Melissopus.**
    Male with hind tubia smooth scaled ---- 13.
13. Abdomen of male with a pair of lateral tufts on eighth segment. (9) **Grapholitha.**
    Abdomen of male simple ---- 14.
14. Male genitalia with a row of strong outer surface marginal spines near anal angle of cucullus of harpe ---- (10) **Ofatulena.**
    Male genitalia with outer surface of harpe unspined ---- (11) **Laspeyresia.** (14) **Carpocapsa.**

No.	Genus	Tho		Female genitalia					Vesti-ture		Remarks
		With posterior tuft	Tegumen scobinate on inner posterior margins	Bursa with two cornuti	Bursa with single cornutus	Bursa without cornuti	Ductus bursae short	Ductus bursae long or moderately so	Normal	Hairy	
1	*Goditha*	----	---	----	----	----	----	----	×	----	Female unknown.
3	*Dichroramplia*	----	---	----	×	----	----	×	×	----	
3	*Satronia*	----	---	----	----	----	----	----	×	----	[1] In male. Female has 12 veins in forewing. Female genitalia unknown.
4	*Ricula*	----	---	----	×	----	×	----	×	----	
5	*Talponia*	----	---	×	----	----	----	×	×	----	[1] Rarely. [2] Sometimes straight. [3] In female only. [4] In one European species. [5] In a few European species.
6	*Hemimene*	----	---	×	----	----	×	----	×	----	
7	*Ethelgoda*	----	---	×	----	----	----	×	×	----	
8	*Sereda*	----	---	×	----	----	×	----	×	----	
9	*Grapholitha*	----	---	×	----	----	×	----	×	----	
10	*Ofatulena*	----	---	×	----	----	----	×	×	----	[1] Socii represented by hair tufts on tegumen.
11	*Laspeyresia*	----	---	×	----	----	×	[1]×	×	----	[1] Rarely.
12	*Hedulia*	----	---	×	----	----	×	----	----	×	[1] Hairy only.
13	*Melissopus*	----	×	×	----	----	×	----	×	----	
14	*Carpocapsa*	----	---	×	----	----	×	----	×	----	
15	*Gymnandrosoma*	×	---	×	----	----	×	----	×	----	
16	*Ecdytolopha*	×	---	×	----	----	----	×	×	----	

Symbols: ×=characters p

COMPARATIVE TABLE OF STRUCTURAL CHARACTERS: LASPEYRESIINAE

No.	Genus	Thorax		Fore wing											Hind wing											Male abdomen			Male hind tibia				Male genitalia						Female genitalia					Vestiture		Remarks
		With posterior tuft	Smooth	Upper internal vein of cell from between 10-11	Upper internal vein of cell from between 9-10	11 veins (7 absent)	12 veins, all separate	Veins 3, 4, and 5 remote at termen or parallel beyond cell	Veins 3, 4, and 5 approximate at termen	Vein 2 from cell at or near middle	Vein 2 from cell at or beyond 3/4	Termen convex or straight	Termen concave	Termen notched below apex	With costal fold in male	With normal pecten	With pecten brush-like and inclosed in pocket (in male)	Without pecten	Vein 7 fusing with 8 beyond cell in male	Veins 6 and 7 separate and parallel	Veins 6 and 7 subparallel	Veins 6 and 7 approximate toward base	Veins 3 and 4 stalked (or united)	Veins 3 and 4 connate	Inner margin in male modified	With pair of lateral tufts on eighth segment	With dorsal tufts on segments 6 and 7	With pair of dorsal lateral tufts on second segment	Simple	Dilated and broadly tufted	With basal hair pencils	Smooth or very slightly rough scaled	Harpe with spines on outer surface near anal angle of cucullus	Socii absent	Socii developed	Cornuti present	Cornuti absent	Tegumen scobinate on inner posterior margins	Bursa with two cornuti	Bursa with single cornutus	Bursa without cornuti	Ductus bursae short	Ductus bursae long or moderately so	Normal	Hairy	
1	*Gediltha*		X	X			X	X		X				X				X		X				X		X						X		X		X								X		Female unknown.
2	*Dichrorampha*		X	X			X	X			X		X		X O	X				X			X	X					X			X		X		X				X			X	X		
3	*Satronia*		X	X		X[1]			X	X			X					X			X			X		X						X		X		X								X		[1] In male. Female has 12 veins in forewing. Female genitalia unknown.
4	*Ricula*		X	X			X	X			X	X				X					X			X		X						X			X	X				X		X		X		
5	*Talponia*		X	X			X	X			X		X			X				X				X		X						X			X	X			X				X	X		
6	*Hemimene*		X	X			X	X	X	X	X	X	X			X						X	X	X		X	X		X			X		X		X			X			X		X		[1] Rarely. [2] Sometimes straight. [3] In female only. [4] In one European species. [5] In a few European species.
7	*Ethelgoda*		X	X			X	X			X		X			X					X			X		X						X		X		X			X				X	X		
8	*Sereda*		X	X			X	X				X						X				X		X		X						X		X		X			X			X		X		
9	*Grapholitha*		X	X			X	X		X		X	X			X						X	X	X		X						X		X		X			X			X		X		
10	*Ofatulena*		X	X			X	X			X		X			X						X		X								X	X		X		X		X				X	X		[1] Socii represented by hair tufts on tegumen.
11	*Laspeyresia*		X	X			X	X	X	X	X	X	X			X	X					X	X	X								X		X		X			X			X	X	X		[1] Rarely.
12	*Hedulia*		X	X			X	X			X	X				X						X	X		X									X		X			X			X			X	[1] Hairy only.
13	*Melissopus*		X	X			X	X	X	X			X				X					X	X		X				X					X			X	X	X			X		X		
14	*Carpocapsa*		X	X			X	X		X		X					X					X	X						X			X		X		X			X			X		X		
15	*Gymnandrosoma*	X					X			X						X						X		X	X					X	X			X		X			X			X		X		
16	*Ecdytolopha*	X			X		X	X		X		X				X						X	X	X	X				X			X		X		X			X				X	X		

Symbols. X = characters present, X O = characters either present or absent.

54346—25. (Face p. 6.)

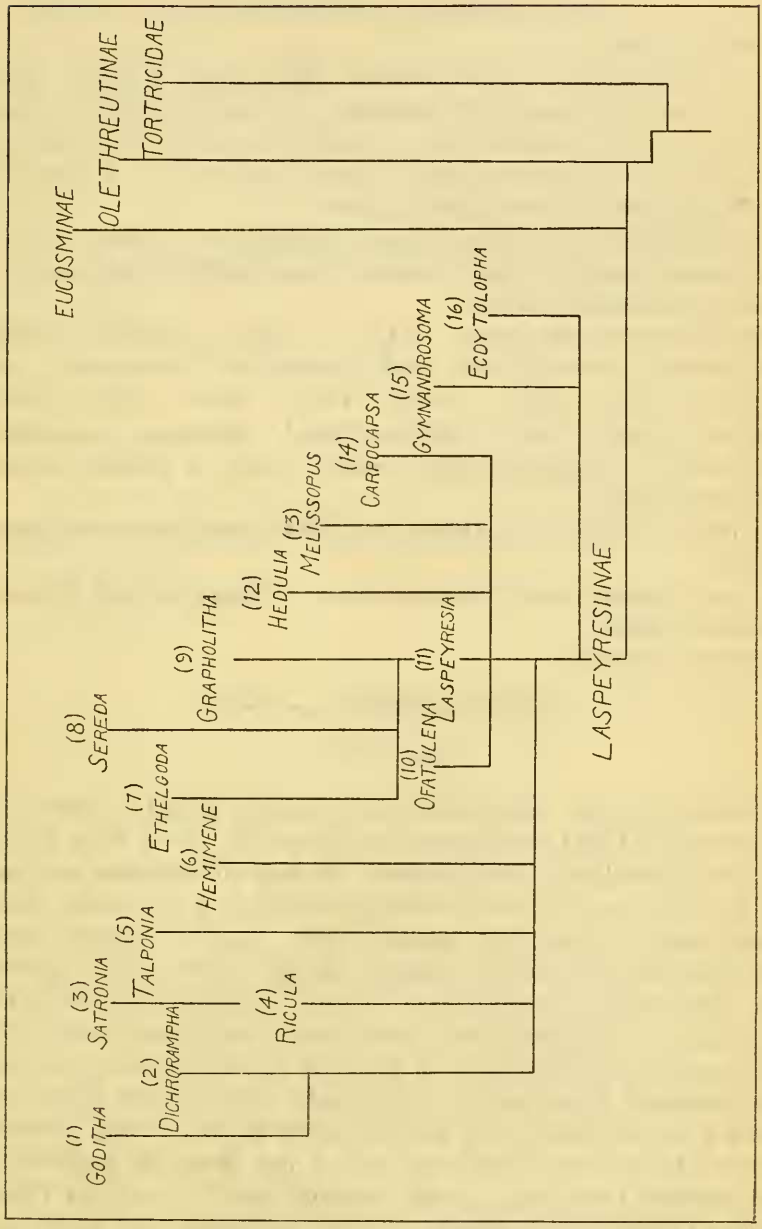

FIG. 1.—PHYLOGENETIC TREE OF THE LASPEYRESIINAE

1. GODITHA, new genus

(Fig. 24.)

Genotype.—*Goditha bumeliana*, new species (North America).

Thorax smooth.

Fore wing smooth; termen notched below apex, decidedly slanting; 12 veins, all separate; 7 to termen; 11 from cell slightly before middle; 10 well separated from 9; upper internal vein of cell from between 10 and 11; 3, 4, and 5 remote at termen; 2 from cell near ½, straight; no costal fold in male.

Hind wing *without* pecten on lower median vein; 8 veins; 6 and 7 separate and parallel; 3 and 4 connate; inner angle in male simple.

Hind tibia smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus well defined, crescentiform; neck incurvation pronounced; neck smooth; sacculus weakly haired. Uncus absent. Socii absent. Gnathos a simple weakly chitinized band. Aedoeagus moderately long, slender, tapering, slightly bent; cornuti a cluster of short deciduous spines.

Abdomen of male with lateral hair tufts from sternite of eighth segment.

A development from *Dichrorampha*. Monotypic and probably tropical in origin.

Female unknown.

GODITHA RUMELIANA, new species

(Figs. 24, 293.)

Antenna fuscous. Palpus and face fuscous, faintly dusted with sordid white. Head and thorax fuscous brown. Fore wing fuscous with white markings, with distinct shading of ocherous on outer half and with some obscure blackish streaking (visible only under magnification); from mid dorsum three narrow irregular white bands partially divided by blackish dusted streaks of the ground color and forming a somewhat broken, outwardly curved white dorsal patch extending to cell; costa faintly strigulated with white, with somewhat broader spots of blackish fuscous between, the dark spots extended (especially on outer half) into narrow black lines upon a pale ocherous brown ground; outer third of wing brownish ocherous dusted with black and with a few definable longitudinal black streaks from end of cell; ocelloid patch a pair of closely appressed obscure dull metallic vertical bars connecting above with fainter metallic streaks from costa and inwardly margined by a narrow white line; along termen below vein 6 four black dots on an ocherous ground; at apex a short fine vertical black dash; cilia pale

leaden fuscous with a whitish subbasal line. Hind wing pale smoky fuscous, slightly paler toward base; silia sordid whitish with a dark basal band.

Male genitalia of type figured.

Alar expanse.—10–13 mm.

Type and paratypes.—Cat. No. 28010, U.S.N.M.

Type locality.—Dallas, Tex.

Food plant.—Bumelia rigida (*B. lanuginosa*).

Described from male type and two male paratypes from the type locality numbered, respectively, 626, 676, and 152, and the type labeled in Fernald's handwriting as follows: "*Dichrorampha boumelliana* Boll mss., two generations, June and Oct. in the rolled leaves of *Boumellia languinosa.*" These specimens are from the Fernald collection.

2. Genus DICHRORAMPHA Guenée

(Figs. 8, 28)

Dichrorampha Guenée, Ann. Soc. Ent. France, ser. 2, vol. 3, 1845, p. 185.
Genotype.—Grapholitha plumbagana Treitschke (Europe).

Lipoptycha Lederer, Wien. Entom. Monats., vol. 3, 1859, p. 370.
Genotype.—Phalaena plumbana Scopoli (Europe).

Hemimene Fernald and Authors (not Hübner), Tortricidae and Their Types, 1908, p. 8.
Genotype.—Phalaena Tortrix petiverella Linnaeus (Europe).

Thorax smooth.

Fore wing smooth; termen slightly concave below apex; 12 veins, all separate; 7 to termen; 11 from cell before middle; 10 more or less approximate to 9; upper internal vein of cell from between 10-11; 3, 4, and 5 well separated at termen; 2 from cell at or near ⅔, straight; male with or without costal fold.

Hind wing with normal pecten; 8 veins; 6 and 7 separate and parallel; 3 and 4 connate or very short stalked; inner margine simple in male.

Hind tibia of male smooth scaled.

Male genitalia with harpe simple; outer surface unspined; cuculus well defined, finely and evenly spined; neck incurvation usually pronounced; neck smooth; succulus small, weakly spined. Tegumen a narrow band. Uncus absent. Socii absent. Gnathos a simple, weakly chitinized band. Aedoeagus curved; long or moderately long; slender and scarcely tapering; cornuti a cluster of several weak deciduous spines.

Abdomen of male simple.

Female genitalia with single thorn-like signum. Ductus bursae moderately long; strongly chitinized toward genital opening and sometimes with a slight chitinization near junction with bursa copulatrix.

A genus about equally represented in North and South America and Europe. The costal fold appears to be an acquired character—not primative for the group. In North America it separates the species into two groups differing decidedly in the shape of the harpe of the male genitalia; those with the fold have the cucullus bent back on costa in the form of a broad hook, and these without the fold have it crescentiform or semitrigonate. This difference however does not hold for the European species (most of these with the fold having the cucullus crescentiform). Busck, ignoring the fold, suggests in his revision of the genus[7] a possible division upon the degree of obliqueness of the termen, the relative positions of veins 9 and 10 and the relative width of areas above and below the median vein of forewing, the protrusion of apex of hind wing relative to tornus of forewing, and the color of the palpi. These characters do not hold with any consistency, and, as far as they do, separate into two groups forms with almost identical genitalia (like *kana* and *capitana*), and group together others with radically different genitalia (like *kana* and *banana*). It is impossible to hold *Lipoptycha* as a separate genus upon any character or set of characters. The division I make here into two groups upon the costal fold is apparently a natural one as far as our American species are concerned, but no farther.

So far as known the larvae are root and shoot borers in Compositae.

KEY TO THE SPECIES OF DICHRORAMPHA

1. Thorax and fore wing striped in orange yellow and blackish fuscous. (12) leopardana
   Thorax and fore wing otherwise ..... 2.
2. Fore wing with three or more black dots on termen near tornus ..... 3.
   Fore wing without such ..... 9.
3. Outer half of fore wing heavily dusted with golden yellow ..... (5) bittana.
   Outer half of fore wing with faint yellow dusting or none ..... 4.
4. Termen of fore wing decidedly slanting, angle with costa less than 60° ..... 5.
   Termen of fore wing less slanting, angle with costa over 60° ..... 6.
5. Fore wing with strong white dorsal spot ..... (2) capitana.
   Fore wing with very faint whitish dorsal spot or none ..... (1) kana.
6. Fore wing with no trace of pale dorsal spot; no costal fold in male. (10) sedatana. (11) dana.
   Fore wing with pale dorsal spot at least indicated, normally strongly marked; male with costal fold ..... 7.
7. Alar expanse 10 mm. and less; dorsal spot of fore wing white, divided by a strong dark line ..... (6) incanana.
   Alar expanse 11 mm. and over; dorsal spot normally yellow, if white unmarked or very faintly lined ..... 8.

[7] Proc. Biol. Soc. Washington, vol. 19, 1906, pp. 173–176.

8. Distribution, Eastern United States and Canada_____ (4) simulana.
   Distribution, Pacific coast States_____ (3) britana.
9. Fore wing fawn color_____ (7) radicicolana.
   Fore wing fuscous with very slight-ochreous dusting_____ 10.
10. Vein 10 from cell over twice as far from 9 as 9 is from 8_____ (9) piperana.
    Vein 10 from cell not over one and one-half times as far from 9 as 9 is from 8_____ (8) banana.

GROUP A. MALE WITH COSTAL FOLD ON FORE WING

1. DICHRORAMPHA KANA (Busck)

(Figs. 8, 273)

Lipoptycha kana BUSCK, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 182.
Lipoptycha planiloqua MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 36.
Hemimene kana BARNES and MCDONNOUGH, Check List Lepid. Bor. Amer. no. 7266, 1917.

This and the two following species are very close. All are somewhat variable and show more or less of a dorsal patch on fore wing. It is least obvious in some specimens of *britana* from California and in *kana*. Specimens from the type localities can be distinguished by the characters given in our key; but it is often difficult to place those from new localities. *D. kana* differs from the others chiefly in the more slanting termen of its fore wing.

Male genitalia figured from paratype in National Collection from the type locality ("Dyar 23577"). Female genitalia as in *capitana*.

Distribution.—British Columbia, Washington, California (Tuolumne Meadows).

Alar expanse.—17–20 mm.

Type.—In National Collection.

Type locality.— Kaslo, British Columbia.

2. DICHRORAMPHA CAPITANA (Busck)

(Figs. 111, 274)

Hemimene capitana BUSCK, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 178.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7262, 1917.

A Rocky Mountain species with a strong white dorsal patch on fore wing.

Male genitalia figured from type; female from specimen in National Collection from Silverton, Colo. ("July 16–23").

Distribution.—Colorado, Utah.

Alar expanse.—13–19 mm.

Type.—In National Collection.

Type locality.—South Park, Colo.

3. DICHRORAMPHA BRITANA (Busck)

(Fig. 275)

Hemimene britana Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 178.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7263, 1917.

Hemimene alpinana Fernald (not Treitschke), in Dyar List N. Amer. Lepid., no. 5290, 1903.

A Pacific coast species resembling *kana* and with the same distribution. Differs chiefly in having termen of fore wing less slanting. Has been confused with the European *alpinana* which it resembles superficially, but from which it differs strikingly in shape of harpe of male genitalia.

Male genitalia figured from specimen in National Collection from Goldstream, British Columbia ("2–VI–21, E. H. Blackmore No. 417"). Female genitalia as in *capitana*.

Distribution.—British Columbia, Oregon, California.

Alar expanse.—14–18 mm.

Type.—In National Collection.

Type locality.—Kaslo, British Columbia.

4. DICHRORAMPHA SIMULANA (Clemens)

(Fig. 276)

Halonota simulana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 351.

Dichrorampha aurisignana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 319.

Hemimene simulana Fernald, in Dyar List N. Amer. Lepid., no. 5289, 1903.—Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 179.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7255, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 389.

An Eastern species resembling *britana*, but with quite different male genitalia; the chitin of the outer margin of the basal opening of the harpe being produced into a short tongue or spur. In all the other species of the costal-fold group (with the exception of *bittana*) this outer margin is evenly rounded. The pattern and color are somewhat variable; specimens from Mount Washington having a much fainter dorsal patch and considerably darker shading on outer half of forewing. They may possibly represent a distinct race; but I do not feel justified in so designating them at this time.

Male genitalia figured from specimen in National Collection from Ottawa, Canada (C. H. Young, "7–VIII–1906"). Female genitalia similar to those of *bittana*.

Distribution.—Virginia, District of Columbia, Pennsylvania, New Jersey, New Hampshire, Maine, Ontario, Quebec.

Alar expanse.—11–16 mm.

Types.—In Academy Natural Sciences, Philadelphia (*simulana*); British Museum (*aurisignana*).

Type localities.—Baltimore, Md. (*simulana*); Washington, D. C. (*aurisignana*).

5. DICHRORAMPHA BITTANA (Busck)

(Figs. 104, 277)

Hemimene bittana Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 180.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7256, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 389.

Close to and possibly a pale race of *simulana;* differs chiefly in the much heavier dusting of ochreous scales on outer half of fore wing.

Genitalia figured from specimens in National Collection from Pittsburgh, Pa. (Henry Engel, "V—29—65," male type) and Cincinnati, Ohio (A. F. Braun, "VI—24—04, female).

Distribution.— Pensylvania, Ohio, Wisconsin.

Alar expanse.—14—15 mm.

Type.—In National Collection.

Type locality.—Pittsburgh, Pa.

6. DICHRORAMPHA INCANANA (Clemens)

(Figs. 108, 279)

Halonota incanana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 351.

Hemimene incanana Fernald, in Dyar List N. Amer. Lepid., no. 5288, 1903.—Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 179.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7254, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 389.

Hemimene nigromaculana Kearfott, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 159.—Barnes and McDunnough, Check List Lepid. Bor. Amer. no. 7264, 1917.

The type of Clemens' species, a small male with distinct costal fold (yellow label, No. 1437), is in Philadelphia. It agrees with Kearfott's *nigromaculana* except that the latter is somewhat larger. Kearfott described from two specimens, but I am able to locate only one (the female type in the American Museum). He had other specimens under his name, but these are incorrectly determined. They are *Grapholitha prunivora* Walsh. Aside from the Clemens and Kearfott types I have seen only one other specimen of the true *incanana*, a male in the National Collection from Falls Church, Va. (Heinrich, "6—6—17").

Male genitalia of this last figured; female genitalia figured from type of *nigromaculana.*

Alar expanse.—8—10 mm.

Types.—In Academy National Sciences (*incanana*); American Museum (*nigromaculana*).

Type localities.—Pennsylvania? (*incanana*); Black Mountains, N. C. (*nigromaculana*).

GROUP B. MALE WITHOUT COSTAL FOLD ON FORE WING

7. DICHRORAMPHA RADICICOLANA Walsingham

(Figs. 109, 282)

Dichrorampha radicicolana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 75.

Hemimene radicolana FERNALD, in Dyar List N. Amer. Lepid., no. 5292, 1903.—BUSCK, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 180.

Hemimene radicicolana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7257, 1917.

A large fawn-colored species. Walsingham gives the expanse of his type (which according to Busck is a female) as 17 mm. All the specimens in our American collections have an expanse of 20 mm. or more.

Male genitalia figured from specimen in National Collection from Deer Park Springs, Lake Tahoe, Calif. ("July 1–7"); female from specimen in American Museum from Colfax, Placer County, Calif.

All specimens in National Collection, American Museum, and collection Barnes from California.

Alar expanse.—17–22 mm.

Type.—In British Museum.

Type locality.—"Camp Watson, on John Days River," Oreg.

Food plant.—"*Scophularia?*" (larva feeding in roots according to Walsingham).

8. DICHRORAMPHA BANANA (Busck)

(Fig. 278)

Lipoptycha banana BUSCK, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 182.

Lipoptycha sordescens MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 36.

Hemimene banana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7267, 1917.

Close to *radicicolana* and with similar genitalia, but darker, and grayish rather than fawn colored. In some specimens there is a faint indication of a pale shade on mid dorsum; but in most it is not distinguishable. This dorsal pale marking is rather variable even in species where it is normally present and sharply contrasted against the ground color.

Male genitalia figured from type. (The harpes are somewhat bent on the slide which has caused a foreshortening of the cuculli in the photograph. They are shaped very much like those of *radicicolana.*) I have seen no females.

Specimens in National Collection, American Museum, and collection Barnes from Colorado.

Alar expanse.—20–24 mm.

Type.—In National Collection.

Type locality.—South Park, Colo.

9. DICHRORAMPHA PIPERANA (Busck)

(Fig. 281)

Hemimene piperana Busck, Proc. Biol. Soc. Washington, vol. 19, 1900 p. 177.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7261, 1917.

Superficially resembling both *banana* and *sedatana*. Differs from the latter very distinctly in genitalia and from both in the venation of fore wing (vein 10 is over twice as far from 9 at base as 9 is from 8 in *piperana*, and much nearer 9 in the other two species).

Male genitalia figured from type.

In addition to the type, I have seen only one other specimen, a male from Washington in the American Museum.

Alar expanse.—18 mm.

Type.—In National Collection.

Type locality.—Pullman, Wash.

10. DICHRORAMPHA SEDATANA (Busck)

(Figs. 107, 283)

Hemimene sedatana Busck, Proc. Biol. Soc. Washington, vol. 19, 1900, p. 177.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7260, 1917.

Hemimene plumbana Fernald (not Scopoli), in Dyar List N. Amer. Lepid., no. 5291, 1903.

Very close to the European *plumbana* and probably only a race of that species. The two have been distinguished on pattern and color; *plumbana* having a somewhat stronger irroration of yellow scales on fore wing and *sedatana* a more abundant dusting of black on the inner margin of the metallic lines. These characters are somewhat variable. In genitalia I see no appreciable difference between the two. For the present, however (at least until the American form is reared), they had best be kept separate.

Genitalia figured from specimens in National Collection from Mount Tzouhalem, British Columbia ("24–V–21, Blackmore No. 424," male), and Siskiyou Mountains, Calif. ("7–VI–15–1872, Walsingham No. 91829," female).

Distribution.—Colorado, California, British Columbia, Alaska.

Alar expanse.—12–15 mm.

Type.—In National Collection.

Type locality.—South Park, Colo.

11. DICHRORAMPHA DANA (Kearfott)

(Fig. 110)

Enarmonia dana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 65.
Enarmonia aequorea MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 34.
Laspeyresia dana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7233, 1917.
Hemimene dana FORBES, Memoir, 68, Cornell Univ. Agr. Sta., 1924, p. 388.

At most an eastern race of *sedatana;* but until the status of the latter can be definitely settled Kearfott's name may as well be kept separate. The only difference I have been able to find between the two (and this is of very doubtful significance) is in the female genitalia; the bursa copulatrix is nearly twice as large in *sedatana* as it is in *dana.* Superficially *dana* resembles *Laspeyresia nigricana* Stephens, and Kearfott has frequently confused the two.

Female genitalia figured from specimen in American Museum from New Brighton, Pa.

Distribution.—Pennsylvania, New Jersey, New Hampshire, Quebec.
Alar expanse.—12–14 mm.
Type.—In American Museum.
Type locality.—Montclair, N. J.

12. DICHRORAMPHA LEOPARDANA (Busck)

(Figs. 105, 280)

Hemimene leopardana BUSCK, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 181.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7258, 1917.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 388.

A striking species, easily distinguished by the leopard-like striping of forewing and thorax. It had been wrongly identified by Kearfott with *incanana* Clemens. The latter is about the same size, but has a costal fold and a white dorsal patch and differs otherwise in structure and pattern.

Genitalia figured from reared specimens in National Collection from Falls Church, Va. (Busck, August 1, 1913.)

Distribution.—North Carolina, Virginia, Maryland, Pennsylvania, Ohio, Kansas, Ontario.
Alar expanse.—8–10 mm.
Type.—In National Collection.
Type locality.—Hyattsville, Md.
Food plant.—*Verbesina* (Larva pupates within the rolled leaf).

3. SATRONIA, new genus

(Fig. 23)

Genotype.—*Satronia tantilla*, new species (North America).

Thorax smooth.

Fore wing smooth; termen slightly concave; 11 veins in male (12 in female), all separate; 7 absent (or united with 8) in male; 11 from cell at middle; 10 approximate to 9; upper internal vein of cell from between 10–11; 3, 4 and 5 slightly approximate at termen; 2 from cell before ⅔, straight; no costal fold in male.

Hind wing *without* pecten on lower median vein; 8 veins; 6 and 7 subparallel; 3 and 4 connate; inner margin in male simple.

Hind tibia of male smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus elongate, narrow, finely and evenly spined; neck incurvation slight; neck slender; sacculus weakly haired. Tegumen a narrow chitinized band. Uncus absent. Socii absent. Gnathos a simple weakly chitinized band. Aedoeagus short, stout, straight; cornuti a dense cluster of short deciduous spines.

Abdomen of male with lateral hair tufts from sternite of eighth segment.

A higher development from *Ricula*. The male genitalia are similar in both except for the socii.

Monotypic and probably of tropical origin.

SATRONIA TANTILLA, new species

(Figs. 23, 285)

Palpus, face and head sordid whitish. Thorax and fore wing grayish fuscous; from costa before middle to mid dorsum a pair of moderately broad outwardly curved leaden metallic bands with a faint dusting of white between; on outer half of costa four short, faint white geminate dashes; ocelloid patch a single, rather wide vertical metallic bar outwardly margined by 5 or 6 short, faint, black dashes upon a fuscous ground faintly dusted with white; terminal edge black; cilia leaden fuscous. Hind wing pale smoky fuscous; cilia sordid whitish with dark basal band.

Male genitalia of type figured.

Alar expanse.—9.5 mm.

Type and *paratype.*—Cat. No. 28011, U.S.N.M.

Type locality.—Archer, Fla.

Described from male type ("No. 2630, May 4–82"); and one female paratype (without abdomen) from Virginia shore opposite District of Columbia (May 25, 1882). The type had been in the National Collection unidentified for several years. It is somewhat

faded; but otherwise in good condition. The female is from the Fernald Collection.

4. RICULA, new genus

(Figs. 4, 25, 106)

Genotype.—Lipoptycha maculana Fernald (North America).

Thorax smooth.

Fore wing smooth; termen convex; 12 veins all separate; 7 to termen; 11 from cell slightly before middle; 10 approximate to 9; upper internal vein of cell from between 10–11; 3, 4, and 5 remote at termen; 2 from cell slightly beyond ⅔, straight; no costal fold in male.

Hind wing with normal pecten; 8 veins; 6 and 7 somewhat approximate toward base (subparallel); 3 and 4 connate; inner margin in male simple.

Hind tibia of male smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus elongate, narrow, finely and evenly spined; neck incurvation slight; neck slender; sacculus weakly haired. Tegumen a narrow chitinized band. Uncus absent. Socii developed, long, fingerlike, flexible. Gnathos a simple weakly chitinized band. Aedoeagus short, stout, straight; cornuti a dense cluster of long deciduous spines.

Abdomen of male with lateral hair tufts from sternite of eighth segment.

Female genitalia with single signum developed as a thornlike spine. Ductus bursae very short and broad. Bursa copulatrix narrow; scobinate at neck.

A monotypic genus presumably of tropical origin. Related to *Talponia*, from which it differs chiefly in the more approximate condition of veins 6 and 7 of hind wing, the convexity of the termen of fore wing, and the absence of one signum from the bursa of the female.

RICULA MACULANA (Fernald)

(Figs. 4, 25, 106, 284)

Lipoptycha maculana Fernald, Journ. New York. Ent. Soc., vol. 9, 1901, p. 51; in Dyar List N. Amer. Lepid., no. 5293, 1903.

Laspeyresia maculana Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 173.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7211, 1917.

A very small dark fuscous species with several long narrow oblique orange costal streaks on fore wing, a large triangular white spot on mid dorsum and an ocelloid patch consisting of a single vertical metallic bar outwardly margined by 3 or 4 black-centered orange spots.

Genitalia figured from paratypes in National Collection from the type locality (H. G. Dyar "833 Fla.," issued Feb. 25–26, 1900).

Represented in the collections, as far as I know, only by the type series in the National Collection.

Alar expanse.—7.5 mm.

Type.—In National Collection.

Type locality.—Florida.

Food plant.—Schoepfia arborescens.

5. TALPONIA, new genus

(Figs. 114, 286)

Genotype.—Hemimene plummeriana Busck (North America).

Characters as in *Ricula* except:

Fore wing with termen incurved below apex; 2 from cell at ⅔.

Hind wing with 6 and 7 separate and parallel.

Female genitalia with two thorn-like signa. Ductus bursae long, slender. Bursa copulatrix large; neck smooth.

Monotypic. Allied to *Ricula*, *Ethelgoda*, and the tropical *Balbis* Walsingham. In wing shape, general habitus most like *Ethelgoda*. In genitalia (male and female) closest to *Balbis*. The latter, however, is quite distinct, having a costal hair pencile on hind wing of male, strong pecten on underside of vein 1^b on fore wing and different venation: 1^c in fore wing absent and 8 weak and closely approximate to cell in hind wing, partially anastomosing with 7 to beyond cell.

TALPONIA PLUMMERIANA (Busck)

(Figs. 114, 286)

Hemimene plummeriana Busck, Proc. Biol. Soc. Washington, vol. 19, 1906, p. 181; Proc. Ent. Soc. Washington, vol. 11, 1909, p. 99.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7259, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 388.

Thorax and basal half of fore wing powdery gray; outer half of fore wing red brown to the naked eye, under magnification brownish orange dusted and streaked with black and heavily marked with purplish metallic bands. Hind wing brown with a narrow yellow border along termen. Larva feeds in flowers of pawpaw.

Genitalia figured from reared specimens in the National Collection from Plummer Island (male) and Hyattsville, Md. (female).

Distribution.—Maryland, Ohio. There is also a specimen in the National Collection from Guerrero, Mexico.

Alar expanse.—9–10 mm.

Type.—In National Collection.

Type locality.—Plummer Island, Md.

Food plant.—Asiminia triloba.

6. Genus HEMIMENE Hübner

(Figs. 6, 27)

Hemimene Hübner, Verz. Schmet., 1826, p. 378. (=*Phthoroblastis* Lederer).

Genotype.—Pyralis populana Fabricius (Europe).

Pammene Hübner, Verz. Schmet., 1826, p. 378.

Genoypte.—Tortrix trauniana Schiffermüller (Europe).

Pseudotomia Stephens, System, Cat Brit. Ins., 1829, p. 175.

Genotype.—Tortrix argyrana Hübner (Europe).

Hemerosia Stephens, List, Brit. Animals, pt. 10, Lepid., 1852, p. 60. (=*Palla* Billberg =*Pyrodes* Guenée, preoccupied).

Genotype.—Phalaena Tinea rhediella Clerck (Europe).

Strophedra Herrich-Schaefer, Schmet. Eur., vol. 5, 1855, p. 94.

Genotype.—Grapholitha flexana Zeller (Europe).

Thorax smooth.

Fore wing smooth; termen straight or slightly concave below apex (at vein 6); 12 veins, all separate; 7 to termen; 11 from cell slightly before middle; 10 more or less approximate to 9; upper internal vein of cell from between 10 and 11; 3, 4, and 5 well separated at termen (often parallel from beyond cell, rarely 3 and 4 approximate at termen); 2 from cell at or before ⅔, straight; no costal fold in male.

Hind wing with normal pecten; 8 veins; in male 7 fusing with 8 beyond cell and 6 well separated; in female 8 free and 6 and 7 approximate toward base; 3 and 4 connate or stalked; inner margin in male simple.

Hind tibia of male smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus densely and evenly spined; neck incurvation appreciable, but slight; neck well spined; sacculus finely haired, sometimes with two or three strong spines. Uncus absent. Socii absent. Gnathos weakly chitinized, a simple band, sometimes expanded beneath into an appreciable subanal plate. Aedoeagus moderately long; rather stout; straight or curved; tapering and often bottle necked; cornuti a cluster of short stout spines, a few fixed, the rest deciduous.

Abdomen of male simple or with modified dorsal hair tufts (under superficial scaling) on segments 6, 6 and 7, or 6, 7 and 8; rarely (in *flexana* Zeller) with a pair of lateral tufts from sternite of eighth segment.

Female genitalia with two thorn-like signa. Ductus bursae very short, unchitinized except near genital opening. Bursa copulatrix large; neck smooth.

The above description is drawn to include the European species with vein 7 running into 8 in the male hind wing. These vary greatly in male abdominal characters: *populana* (type of *Hemi-*

mene), *spiniana* Duponchel and *fimbriana* Haworth have the abdomen simple; *trauniana* (type of *Pammene*), *oxycedrana* Millière, *splendidulana* Guenée and *amygdalana* Duponchel have a tuft on sixth segment only; *argyrana* (type of *Pseudotomia*), *juliana* Curtis, *gallicolona* Zeller, *christophana* Moeschler, *regiana* Zeller and our four North American species have tufts on abdominal segments 6 and 7; *rhediella* Clerck (type of *Hemerosia*) has them on 6, 7 and 8; *flexana* Zeller (type of *Strophedra*) has lateral tufts on the eighth segment like these of *Grapholitha*, otherwise the abdomen is smooth. This last has other differences also; the fore wing has termen decidedly slanting, costa sharply bent at apex and apex somewhat pointed and produced and veins 3, 4, and 5 widely separated at termen. Very likely when larvae and pupae are studied it may be found advisable to divide the genus. In that case all the above synonyms will take their places as valid genera and the American species be referred to *Hemerosia*. At present nothing would be gained by splitting.

It is unfortunate that the name *Hemimene*, which has hitherto been used for the moths now under *Dichrorampha*, must be substituted for *Pammene*; but the fixing of *populana* as type by Walsingham and Durrant (1901) compels it.

In Europe the larvae are leaf tiers, feeders in galls (inquilines) or under bark of forest trees. The larvæ of none of our American species are known.

Derived from and a higher development of *Laspeyresia*.

KEY TO THE SPECIES OF HEMIMENE

1. Fore wing with well-marked white patch on dorsum ..... 2.
   Fore wing without such ..... (4) **paula.**
2. White dorsal patch continuous to base of wing ..... 3.
   White dorsal patch limited to a spot on mid-dorsum ..... (3) **signifera.**
3. White costal geminations on outer half of fore wing strong and partially fused; metallic markings dull, leaden ..... (1) **ocliferia.**
   White costal geminations on outer half of fore wing faint and well spaced; metallic markings bright, bluish ..... (2) **felicitana.**

1. HEMIMENE OCLIFERIA, new species

(Fig. 291)

Antenna ocherous. Palpus white. Face white. Head grayish fuscous. Thorax dark grayish fuscous; posterior margin and tip of tegula white. Fore wing dark grayish fuscous (almost black) with white costal strigulations and an elongate irregular white dorsal patch extending from base to beyond middle; white dorsal patch slightly narrower at base than at middle of dorsum; costal strigulation beyond mid costa partially fused forming a whitish shade on apical half of costa; ocelloid patch obscure, four indistinct black streaks between two faint vertical metallic bars on a blackish gray

ground; edge of termen black, broken below apex, at middle and at tornus by white spots; cilia leaden fuscous; white dorsal patch and costal markings repeated on under side of wing. Hind wing dark smoky brown; cilia shining white with dark basal band; on under side basal half of wing whitish. Legs white; outer sides dusted with dark grayish fuscous.

Male genitalia of type figured.

Alar expanse.—12–14 mm.

Type.—In collection Barnes.

Paratypes.—Cat. No. 28012, U.S.N.M. Also in American Museum and collection Barnes.

Type locality.—Pyramid Lake, Nev.

Described from male type and five male paratypes from type locality.

Close to *felicitana* and with similar genitalia. Easily distinguished by the characters given in the key.

2. HEMIMENE FELICITANA (Heinrich)

(Figs. 116, 292)

Pammene felicitana Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 120.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 389.

An eastern species similar to *ocliferia* but with much brighter metallic markings on forewings.

Male genitalia figured from type in American Museum; female from paratype in National Collection from Oak Station, Pa. (Marloff, "June 19–07.")

Distribution.—Pennsylvania, Quebec.

Alar expanse.—13–14 mm.

Type.—In American Museum.

Type locality.—Montreal, Quebec.

3. HEMIMENE SIGNIFERA, new species

(Fig. 290)

Antenna fuscous. Palpus and face fuscous ocherous. Head fuscous ocherous, darker at sides. Thorax semilustrous leaden fuscous. Forewing blackish (or dark grayish) fuscous; on mid dorsum a conspicuous nearly square white spot reaching up to cell; costa with a faint antemedian and four postmedian pair of obscure whitish ocherous germinate marks; ocelloid patch obscure, consisting of four or five black streaks interspaced with ocherous scaling and between two dull vertical metallic bars; edge of termen black; cilia leaden fuscous. Hind wing smoky fuscous; cilia pale fuscous with a dark basal band. Underside of fore and hind wings concolorous, pale smoky fuscous. Legs pale ocherous fuscous.

Male genitalia of type figured.

Alar expanse.—12 mm.

Type.—In Canadian National Collection.

Type locality.—Lake of Bays, Ontario.

Described from unique male type (McDunnough, "1–VII–1920").

4. HEMIMENE PAULA, new species

(Fig. 289)

Antenna blackish. Palpus, face, head, and thorax blackish with the extreme ends of the scales white. Forewing dark grayish fuscous; from costa before middle a pair of narrow dull metallic lines curving out to a little beyond middle of cell and thence back to mid dorsum forming a complete fascia; bordering this, outwardly, a black dusted shading of the ground color, appearing to the naked eye as a blackish brown fascia; outer half of costa with four pair of white geminate marks from the first and second of which extend faint metallic lines to the vertical bars of ocelloid patch; ocelloid patch obscure, consisting of a couple of indistinct, irregular black dashes upon an ocherous ground between two dull metallic vertical bars; edge of termen black; cilia leaden fuscous. Hind wing smoky fuscous; cilia whitish with a dark basal band; underside of wing pale (smoky whitish) with a few dark spots at apex. Legs dark grayish fuscous; tarsi faintly annulated with white.

Male genitalia of type figured.

Alar expanse.—10 mm.

Type.—In Canadian National Collection.

Type locality.—Aweme, Manitoba.

Described from unique male (N. Criddle, "11–V–1921").

7. ETHELGODA, new genus

(Figs. 26, 122)

Genotype.—Phthoroblastis texanana Walsingham (North America).

Thorax smooth.

Forewing smooth; termen incurved below apex; 12 veins, all separate; 7 to termen; 11 from cell at middle; 10 approximate to 9; upper internal vein of cell from between 10–11; 3, 4, and 5 parallel from slightly beyond cell; 2 from cell near ⅔, straight; no costal fold in male.

Hind wing with normal pecten; 8 veins; 6 and 7 subparallel; 3 and 4 connate; inner margin in male simple.

Hind tibia of male smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus small, rounded, heavily spined; neck incurvation deep; neck slender,

smooth; sacculus weakly haired. Uncus absent. Socii absent. Gnathos a simple weakly chitinized band. Aedoeagus long, stout, tapering, slightly curved; cornuti a cluster of very small slender deciduous spines.

Abdomen of male with lateral hair tufts from sternite of eighth segment.

Female genitalia with two thorn-like signa. Ductus bursac moderately long; strongly chitinized toward genital opening and with a chitinized patch near junction with bursa copulatrix.

Monotypic and probably of tropical origin. The genus has hardly a single character to define it, yet on the sum of its characters it fits in none of the other genera. On wing pattern and general habitus it should go with *Talponia* (*T. plummeriana* and *E. texanana* differ superficially only in color). On male genitalia and abdominal characters it could go in *Grapholitha*. Its female genitalia (except for the two signa) are those of *Dichrorampha*. Its hind wing venation is that of *Ricula*. A separate designation is therefore necessary unless we are to confuse the definition of our other genera.

Derived from *Grapholitha*.

ETHELGODA TEXANANA (Walsingham)

(Figs. 26, 122, 287)

Phthoroblastis texanana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 70.

Pammene texanana FERNALD, In Dyar List N. Amer. Lepid. no. 5294, 1903.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer. no. 7268, 1917.

In pattern and general habitus similar to *Talponia plummeriana* Busck, but with different genitalia and without the distinctly reddish shade on outer half of fore wing. Thorax and basal half of fore wing powder gray; outer half of wing brownish; from mid costa to dorsum near tornus a straight narrow dull metallic band; from costa just beyond, a similar narrow band curving out to a point between veins 6 and 7 a short distance from termen thence inward to base of vein 3 and thence down to dorsum; termen finely edged with ocherous, bordered near tornus by a dull metallic band; a subterminal row of small black dots or abbreviated dashes. Hind wing brown.

Genitalia figured from specimens in National Collection from Dallas, Tex. ("595," male) and Biscayne Bay, Fla. (female).

The only specimens I have seen are three males from Texas and the female from Florida from the Fernald collection in the National Museum; one of these had evidently been referred to Walsingham and determined by him.

Alar expanse.—10–13 mm.

Type.—In British Museum.

Type locality.—Texas.

8. Genus SEREDA Heinrich

(Figs. 29, 118)

Sereda Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 121.

Genotype.—Halonota lautana Clemens (North America).

Thorax smooth.

Fore wing smooth; termen covex; 12 veins, all separate; 7 to termen; 11 from cell before middle; 10 approximate to 9; upper internal vein of cell from between 10 and 11; 3, 4 and 5 remote at termen; 2 from cell just before ½; straight; no costal fold in male.

Hind wing *without* pecten on lower median vein; 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; inner margin simple in male.

Male genitalia with outer surface of harpe unspined; cucullus trigonate; neck very slender; neck incurvation deep; sacculus enlarged, weakly spined. Tegumen a narrow chitinous band. Uncus absent. Socii absent. Gnathos a simple, weakly chitinized band. Aedoeagus long, stout, slightly bent, scarcely tapering; cornuti 3 or 4 short, stout fixed and a cluster of deciduous spines.

Abdomen of male with a pair of long hair tufts from lateral extremities of sternite of eighth abdominal segment.

Female genitalia with two signa, developed as thornlike spines. Ductus bursae short, chitinized and bent.

A monotypic genus derived from *Grapholitha*. The absence of pecten is rare for the family, occuring elsewhere, as far as I know, only in *Satronia* and *Goditha*.

SEREDA LAUTANA (Clemens)

(Figs. 29, 118, 288)

Halonata lautana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 139, (as *tautana* through typographical error).

Grapholitha perfluana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 299.

Enarmonia lautana Fernald, in Dyar List N. Amer. Lepid., no. 5279, 1903.—Kearfott, Can. Ent., vol. 37, 1905, p. 254.

Laspeyresia lautana Kearfott, Ins., New Jersey, 1910, p. 546.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7231, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 391.

Sereda lautana Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 121.

Easily identified by structural characters and the strong black dots along termen on upper and under side of fore wing. In one specimen in the National Collection veins 7 and 8 of fore wing are stalked. This, however, is very unusual. In all other specimens I have seen they are distinctly separate.

Genitalia figured from specimens in National Collection from Oxbow, Saskatchewan (Knab, "15–V–07," male), and New Brighton, Pa. (Merrick, "4–14–03," female).

Distribution.—Massachusetts, New Hampshire, New York, New Jersey, Pennsylvania, Texas, Manitoba, Saskatchewan.

Alar expanse.—10–12 mm.

Types.—In Academy National Sciences (*lautana*); Museum Comparative Zoology (*perfluana*).

Type localities.—Virginia (*lautana*); Texas (*perfluana*).

9. Genus GRAPHOLITHA Treitschke

(Fig. 7)

Grapholitha Treitschke, Schmet. Eur., vol. 7, 1829, p. 232 (=*Stigmonota* Guenée).

Genotype.—Pyralis dorsana Fabricius (Europe).

Euspila Stephens, Syst. Cat. Brit. Ins., 1829, p. 103.

Genotype.—Tinca compositella Fabricius (Europe).

Ephippiphora Duponchel, Hist. Nat. Lépid. France, vol. 9, 1834, pp. 22, 304.

Genotype.—Phalaena Tinca jungiella Clerck (Europe).

Opadia Guenée, Eur. Microlepid, Index Method., 1845, p. 48.

Genotype.—Grapholitha funebrana Treitschke (Europe).

Thorax smooth.

Fore wing smooth; termen straight or convex, or with a very slight concavity at vein 6; 12 veins, all separate (in aberrant specimens 7 and 8 are occasionally short stalked, but this character does not seem to hold even for species); 7 to termen; 11 from cell at or a trifle before middle; 9 and 10 well separated; upper internal vein of cell from between 10–11; 3, 4 and 5 well separted at termen; 2 from cell before ⅔, straight or very slightly bent; male without costal fold.

Hind wing with normal pecten; 8 veins; 6 and 7 approximate towards base; 3 and 4 connate or very short stalked; inner margin simple in male.

Hind tibia of male smooth scaled.

Male genitalia with harpe simple; outer surface unspined; cucullus well defined, finely and evenly spined; neck incurvation usually pronounced; neck smooth or very weakly spined; sacculus simple, weakly spined. Tegumen a rather narrow band. Uncus absent. Socii absent. Gnathos a simple, weakly chitinized band. Aedoeagus straight or very slightly curved; rather long; stout or moderately so and evenly tapering; cornuti a cluster of three or more spines, one or two fixed, the rest deciduous, rarely all fixed.

Sternite of eighth abdominal segment (in male) developed as a narrow, chitinized band at the lateral extremities of which are a pair of long heavy hair tufts (fig. 7.).

Female genitalia with two signa developed as thorn like spines; signa rarely absent. Ductus bursae short; strongly chitinized and often scobinate near genital opening.

Derived from *Laspeyresia.* Is well represented in Europe and North America. On the ocelloid patch it divides into what appear to be two natural groups. I do not think however that these deserve generic rank, since there are no characters other than the ocelloid patch on which to separate them.

KEY TO THE SPECIES GRAPHOLITHA

1. Ocelloid patch of fore wing a pair of vertical metallic bars, well separated and inclosing one or more black dots or longitudinal streaks_____ 2.
   Ocelloid patch a single vertical bar, or two closely appressed vertical metallic bars scarcely separated by a vertical line of darker scaling__ 13.
2. Fore wing with one or more distinct white geminate marks on mid dorsum _____ 3.
   Fore wing with pale dorsal markings obscure or absent_____ 6.
3. Fore wing with a faint, scattered dusting of white scales at base, on disk, and along termen_____ (10) **imitativa.**
   Fore wing without such white dusting_____ 4.
4. Ocelloid patch containing six unbroken longitudinal black streaks; white dorsal geminations broad_____ (8) **fana.**
   Black longitudinal markings of ocelloid patch irregular, broken, and less than six; white dorsal geminations narrow_____ 5.
5. Hind wing distinctly paler than ground color of fore wing; post median area of fore wing darker than basal area_____ (11) **lunatana.**
   Hind wing dark, nearly concolorous with ground color of fore wing; post median area of fore wing no darker than basal area.
   (9) **conversana** (part).
6. Hind wings hyaline white toward base; broadly margined with dark fuscous at apex_____ (12) **eclipsana.**
   Hind wings sometimes pale toward base but never hyaline white_____ 7.
7. Fore wing with white dusting on fore wing forming an obscure, angulate pale median fascia_____ (7) **vitrana.**
   Fore wing without such a pale median fascia_____ 8.
8. Fore wing longitudinally streaked on disk and well dusted toward apex with rusty ocherous scales_____ (4) **prunivora.**
   Fore wing without such ocherous scaling_____ 9.
9. Fore wing with six or more distinct white geminations on costa_____ 10.
   Fore wing with costal geminations obsolete or distinguishable only as very faint, minute streaks_____ 11.
10. Costal geminations evenly spaced_____ (5) **angleseana.**
    Apical pair of costal geminations well separated from the preceding four.
    (6) **caeruleana.**
    (9) **conversana** (part).
11. Fore wing fully half as broad as long; costa appreciable arched toward apex _____ (1) **molesta.**
    Fore wing somewhat less than half as broad as long; costa straight toward apex_____ 12.
12. Male with heavy black scaling on hind wing_____ (3) **packardi.**
    Male without sex scaling on hind wing_____ (2) **libertina.**
13. Four geminate white streaks on mid dorsum of fore wing_____ 14.
    Two geminate white streaks on mid dorsum of fore wing_____ 15.
14. Entire palpus white_____ (17) **tristrigana.**
    Palpus strongly dusted with fuscous toward apex_____ (15) **lana** (part).

15. Thorax and base of fore wing pale drab brown, paler than ground color of rest of wing ..... (13) interstinctana.
Thorax and base of fore wing fuscous brown, concolorous with ground color of rest of wing ..... 16.
16. Hind wing cilia uniformly clear white except for contrasting dark basal band ..... (14) edwardsiana.
Hind wing cilia pale fuscous; sometimes shaded with whitish but never distinctly white ..... 17.
17. Some faint whitish dusting on terminal area of fore wing; dorsal geminate markings extending above middle of wing ..... (16) dyarana.
No white dusting on terminal area; dorsal geminations not extending above middle of wing ..... (15) lana (part).

GROUP A.—OCELLOID PATCH CONSISTING OF TWO VERTICAL BARS INCLOSING BLACK DOTS OR LONGITUDINAL STREAKS

1. GRAPHOLITHA MOLESTA (Busck)

(Figs. 129, 305)

Laspeyresia molesta BUSCK, Journ. Agr. Res. U. S. Dept. Agr., vol. 7, 1916, p. 373.—QUAINTANCE and WOOD, Journ. Agr. Res. U. S. Dept. Agr., vol. 7, 1916, pp. 373–377.—CHUKICHI HARUKAWA and NOBUMASA YAGI, Berichte des Ohara Instit., Juraschiki, Japan, vol. 1, pt. 2, 1917, pp. 151–170; vol. 2, pt. 3, 1923, pp. 235–258.—YASUSHI NAWA, Insect World, Gifu, vol. 21, no. 7, pl. 7.—WOOD and SELKREGG, Journ. Agr. Res. U. S. Dept. Agr., vol. 13, 1918, pp. 59–72.—GARMAN, Bull. no. 223, Maryland Agr. Exp. Station, 1918, pp. 103–126.—PAOLI, Agr. Col. Florence, vol. 15, 1921, pp. 572–576.—MEYRICK, Entomologist, vol. 55, 1922, p. 255.—TRUVELOT, Bull. Soc. Ent. France, 1922, pp. 220–223.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

The well-known oriental peach moth of economic literature. It is an important enemy of peach, apple, and a number of other fruit trees, the larva boring in the growing shoots and also tunneling the fruits.

A moderately large, dark, slate-colored species with very obscure markings. Most closely resembling *packardi* and *libertina* but easily separable from both. Hind wing with veins 3 and 4 connate.

Male and female genitalia figured from reared specimens in National Collection from Arlington, Va. (on peach, E. R. Selkregg, "5–6–19").

Distribution.—District of Columbia, Maryland, Virginia, Pennsylvania, Indiana, North Carolina, Tennessee, Arkansas, Mississippi, Georgia, Alabama, Florida. We also have in the National Collection reared specimens from Japan and Australia.

These last are part of a series determined by August Busck for W. W. Frogatt, and which the latter had previously figured and described[8] as an unidentified enemy of the peach in Australia under the popular name peach-tip moth. This is the first reference to the species in literature.

[8] Agr. Gazette, New South Wales, May, 1914, p. 413.

There are also authentic records from France and Italy.

Alar expanse.—11–13 mm.

Type.—In National Collection.

Type locality.—Arlington, Va.

Food plants.—Apple, peach, quince, plum, pear, nectarine, apricot, and cherry.

2. GRAPHOLITHA LIBERTINA, new species

(Fig. 294)

A western species of the same size and color as *packardi* Zeller and with similar maculation; but without the characteristic hind wing sex scaling of the latter and with different genitalia. Palpus, head, thorax, and fore wing an almost unicolorous fuscous brown; fore wing very faintly dusted with whitish scales and with an obscure narrow dark fascia from mid costa to outer fifth of dorsum; ocelloid patch obscure, containing four or five faint black dashes. Hind wing uniformly brownish, but little paler than fore wing; cilia concolorous, with dark basal band. Male genitalia with costa of harpe more decidedly curved than that of *packardi.*

Male genitalia of type figured.

Alar expanse.—9.5 mm.

Type.—In American Museum.

Paratype.—Cat. No. 28013, U.S.N.M.

Type locality.—Wellington, British Columbia.

Described from male type and paratype from the type locality (G. W. Taylor, collector). These two specimens had been included by Kearfott with a series of the eastern *packardi* under the latter name.

3. GRAPHOLITHA PACKARDI Zeller

(Figs. 132, 295)

Grapholitha packardi Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 300.

Steganoptycha pyricolana Murtfeldt, Bull. 23, U. S. Dept. Agr., 1891, p. 52.—Sanderson, 12th Ann. Rep. Deleware Agr. Exp. Sta., 1901, p. 195; Can. Ent., vol. 35, p. 159.

Epinotia pyricolana Fernald, In Dyar List N. Amer. Lepid., no. 5234, 1903.

Enarmonia packardi Fernald, in Dyar List N. Amer. Lepid., no. 5282, 1903.

Enarmonia pyricolana Kearfott, Ins. New Jersey, 1910, p. 544.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7158, 1917.—Garman, Bull. 223, Maryland Agr. Exp. Sta., 1918, pp. 105, 106, 108, and 109.

Laspeyresia packardi Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7238, 1917.—(not Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 392.)

Laspeyresia pyricolana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 395.

A species of some economic importance as an enemy of apple. The larva is apt to be confused with that of *molesta* which it much resembles. It usually attacks the growing twigs, seldom the fruit. It has also been reared from rose tips and there are a couple of doubtful records from peach.

The adult is smaller than that of *molesta* and has a faint but distinguishable dark median fascia on fore wing. Its most striking character, however, is a strong patch of blackish sex scaling upon the upper surface of the hind wing and a similar patch on the under surface of the fore wing of the male. This character as far as I know is shared by no other North American species of *Grapholitha* or *Lespeyresia*. Zeller's type, unfortunately, is a female; but I do not think there can be any doubt of its synonymy with Miss Murtfeld's species.

Hind wing with veins 3 and 4 connate.

Genitalia figured from specimens in National Collection from Plummer Island, Md. (Busck, July, 1903, male) and Missouri ("368–M," "5–2–07" reared from "rose tips," female).

Distribution.—Texas, Mississippi, Missouri, Arkansas, Illinois, Michigan, Maryland, West Virginia, Virginia, New Jersey, Delaware, Massachusetts, New Hampshire.

Alar expanse.—8–10.5 mm.

Types.—Museum Comparative Zoology (*packardi*); lost (*pyricolana*).

Type localities.—Texas (*packardi*); Missouri (*pyricolana*).

Food plants.—Apple, rose, (peach?), *Crataegus*.

4. GRAPHOLITHA PRUNIVORA (Walsh)

(Figs. 130, 296)

Semasia prunivora Walsh, First Rep. Ins. Illinois, 1868, pp. 105–110.

Enarmonia prunivora Fernald, in Dyar List N. Amer. Lepid., no. 5269, 1903.—Quaintance, U. S. Dept. Agr., Bur. Ent. Bull. no. 68, pt. 5. 1908, pp. 49–60.

Laspeyresia prunivora Barnes and McDunnough, Check List Lepid. Bor. Amer. no. 7208, 1917.—Garman, Bull. 223, Maryland Agr. Exp. Sta., 1918, pp. 105–107.—Wellhouse, Memo. 56, Cornell Agr. Exp. Sta., 1922, p. 1078.—Forbes, Memo. 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 392.

Another rather common species, known in economic literature as the lesser apple worm.

Genitalia figured from specimens in National Collection, reared from crab apple but without locality labels ("Aug. 19–82," male and "Quaintance No. 875," female).

Hind wing with veins 3 and 4 connate.

Distribution.—District of Columbia, Maryland, Virginia, West Virginia, Pennsylvania, Indiana, Illinois, Missouri, Arkansas, Washington, Maine, Ontario.

Alar expanse.—8–10 mm.

Type.—In National Collection.

Type locality.—Illinois.

Food plants.—Fruits of apple, plum, peach, cherry, *Crataegus*, *Amelanchier;* also in "black-knot" fungus and in aphid galls on oak and elm.

5. GRAPHOLITHA ANGLESEANA (Kearfott)

(Figs. 127, 304)

Enarmonia angleseana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 64.

Laspeyresia angleseana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7214, 1917.—FORBES, Memo. 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 393.

Hind wing with veins 3 and 4 connate.

Male and female genitalia figured from paratypes in National Collection from type locality.

Distribution.—New Jersey, Massachusetts.

Alar expanse.—10–11 mm.

Type.—In American Museum.

Type locality.—Anglesea, N. J.

Food plant.—"Strawberry seeds" (Fernald rearing note).

6. GRAPHOLITHA CAERULEANA Walsingham

(Figs. 125, 299)

Grapholitha caeruleana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 66.

Enarmonia caeruleana FERNALD, in Dyar List N. Amer. Lepid., no. 5277, 1903.

Enarmonia zana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 61.

Enarmonia vana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 62.

Enarmonia xanthospora MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Enarmonia coleuca MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Laspeyresia vana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7227, 1917.

Laspeyresia zana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7228, 1917.

Laspeyresia caeruleana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7229, 1917.

Male paratype from Fernald collection in the National Museum.

The genitalia (male and female) of Kearfott's two species and *caeruleana* agree in all details. There is a slight difference in some specimens in the color of the hind wing cilia, but this is not constant for any given locality or collecting date, and the gradation is gradual from white to pale smoky fuscous. Kearfott was unable to distinguish the different forms himself, for he had several specimens of each set aside under another name ("*bandana*") as cotypes of a new species.

Male abdominal tufts consisting entirely of fine hairs.

Hind wing with veins 3 and 4 connate of very short stalked.

Genitalia figured from specimens in National Collection from Mount Tzouhalem ("24–V–23, E. H. Blackmore No. 439," male) and Wellington, British Columbia ("T. Bryant, VI," female).

Distribution.—British Columbia, California, Colorado, Nevada.

Alar expanse.—10–14 mm.

Types.—In British Museum (*caeruleana*); American Museum (*zana* and *vana*).

Type localities.—Rogue River, southern Oregon, (*caeruleana*); Wellington, British Columbia (*zana*); Colfax, Placer County, Calif. (*vana*).

7. GRAPHOLITHA VITRANA Walsingham

(Figs. 131, 303)

Grapholitha vitrana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 65.

Enarmonia vitrana Fernald, in Dyar List N. Amer. Lepid., no. 5278, 1903.

Laspeyresia vitrana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7230, 1917.

Paratype in National Collection.

Similar and very close to the preceeding but apparently distinct. The white dusting on the middle of fore wing forms (in normal specimens) an indistinct pale median somewhat larger transverse shade which is much fainter or entirely lacking in *caeruleana; vitrana* also has somewhat larger male genitalia and a differently shaped genital plate in the female.

The cornuti of the two species are similar (one or two rather long stout attached spines and a cluster of shorter deciduous ones); in *caeruleana* there are two of the permanently attached spines while in *vitrana* there appears to be only one. The latter species is somewhat variable. In some specimens the hind wing is distinctly pale (whitish) toward base while in others it is evenly dark throughout.

Male abdominal tufts consisting of mixed flattened and cylindrical hairs.

Hind wing with veins 3 and 4 connate or very short stalked.

Genitalia figured from specimens in National Collection from Carmel, Calif. ("A. H. Vachell, IV.").

Specimens in National Collection, American Museum, and collection Barnes from California.

Alar expense.—15–16 mm.

Type.—In British Museum.

Type locality.—Northern Oregon.

8. GRAPHOLITHA FANA (Kearfott)

(Figs. 7, 126, 297)

Enarmonia fana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 64.
Enarmonia oenochroa MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 34.
Laspeyresia fana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7213, 1917.—FORBES, Memoir 68, Cornell Univ. Agr. Expt. Sta., 1924, p. 393.

Hind wing with veins 3 and 4 short stalked.

Genitalia figured from specimens in National Collection from Anglesea, N. J. (W. D. Kearfott, "V–29–05," male paratype) and Plummer Island, Md. (R. C. Shannon, June 9, 1914, female).

Distribution.—New Jersey, Maryland, North Carolina, Ohio, Kansas.

Alar expanse.—8–9 mm.

Type.—In American Museum.

Type locality.—Anglesea, N. J.

Food plant.—Meibomia (larvae in flower heads and terminal buds.)

9. GRAPHOLITHA CONVERSANA Walsingham

(Figs. 133, 301)

Grapholitha conversana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 66.
Enarmonia conversana FERNALD, in Dyar List N. Amer. Lepid., no. 5272, 1903.
Enarmonia wana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 60.
Enarmonia cupida MEYRICK, Ent. Mo. Mag., vol. 48, 1912, p. 34.
Laspeyresia conversana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7223, 1917.
Laspeyresia wana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7226, 1917.

A Pacific coast species much resembling the eastern *fana* but with different genitalia; the female genital plate and the chitinization of the ductus are quite differently shaped and the aedoeagus is much stouter. The cornuti in *conversana* are arranged upon a horseshoe shaped chitinous band and are all deciduous except one rather slender spine which is fixed at one of the tips of the band. The wing patern is somewhat variable. In a large reared series from Oregon in the National Museum some specimens show but faint traces of the dorsal white marks and a few are entirely without them. Normally, however, the dorsal white geminations are present and sharply defined. The abnormal specimens will run to *caeruleana* in our key, but can be separated by their genitalia.

Kearfott's *wana* is a straight synonym, agreeing in all details with a paratype of *conversana* from the Fernald collection in the National Museum.

Hind wing with veins 3 and 4 connate or very short stalked.

Genitalia figured from paratypes in National Collection from San Luis Obispo ("March, A. H. Vachell," male) and Carmel, Calif. ("A. H. Vachell, IV," female).

Distribution.—California, Oregon, Washington, British Columbia.

Alar expanse.—8–12 mm.

Types.—In British Museum (*conversana*); American Museum (*wana*).

Types localities.—"Camp Watson, on John Day's River, Oreg." (*conversana*); Carmel Calif. (*wana*).

Food plants.—*Trifolium fimbriatum*, cranberry (U. S. Bureau of Entomology rearings).

10. GRAPHOLITHA IMITATIVA, new species

(Fig. 134, 298)

A western species similar to *conversana* and *lunatana* in pattern but distinguishable from both by the genitalia and the characters given in the key. The sacculus of the harpe is considerably longer in proportion to the rest of that organ in *imitativa* than in either of the other two species.

Antenna brown. Palpus sordid grayish white more or less dusted with fuscous. Head brownish fuscous. Fore wing semilustrous dark brownish fuscous with a faint scattered dusting of whittish scales at base, on disk and along termen; costa with four pairs of short white geminate dashes, a pair before middle, two pairs close together beyond middle and a pair close to apex; the first of the antemedian geminations, the first and fourth of the postmedium and the outer of the apical are continued for a short distance as leaden metallic streaks; from mid dorsum a narrow outwardly curved white geminate mark (sometimes partially divided by a thin line of brown scaling) extends to middle of cell; ocelloid patch consisting of a moderately long, vertical, metallic inner bar and a much shorter, slanting outer bar inclosing two longitudinal black dashes (in upper part of patch) and two or three small irregular black dots upon a whitish or whitish ocherous ground; cilia pale lustrous leaden fuscous with black basal line, outwardly finely edged with whitish scaling, the black line cut below apex by an obscure white spot. Hind wing dark brown, almost concolorous with fore wing; cilia pale, smoky, with dark basal band and the tips of the hairs shading to white and with a white spot on costa close to apex; veins 3 and 4 connate.

Genitalia figured from paratypes in National Collection from Goldstream, British Columbia ("31–V–21, E. H. Blackmore No. 378," male and San Francisco, Calif. (female). Male abdominal tufts consisting entirely of fine hair like scales.

Alar Expanse.—10.5–12 mm.

Type and *paratypes.*—Cat. No. 28014, U.S.N.M. Paratypes also in American Museum, Canadian National Collection and collections Barnes and Blackmore.

Type locality.—San Francisco, Calif.

Described from male type, 8 male and 7 female paratypes from the type locality; 5 male and 1 female paratypes from the Hy. Edwards Collection of the American Museum labeled "California," "3851," and "722"; 4 male and 2 female paratypes from Goldstream, British Columbia (E. H. Blackmore, "16–IV–21," "17–IV–21," and "31–IV–21" Blackmore numbers "378," and "379" and "796"); 1 male and 1 female paratype from Fitzgerald, British Columbia (E. H. Blackmore, "14–V–1922"); 1 male paratype from Salmon Arm, British Columbia ("15–5–21, W. R. B."); and 1 female paratype from Waterton Lakes, Alberta (J. McDunnough, "20–VI–1923").

This species has been appearing in our collections as *conversana* Walsingham. The true *conversana* is close to it but distinct and equal to what Keargott described as *wana*. *G. imitativa* is most like *lunatana* but has termen of fore wing decidedly less slanting.

11. GRAPHOLITHA LUNATANA Walsingham

(Figs. 128, 300)

Grapholitha lunatana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 66.

Enarmonia lunatana Fernald, in Dyar List N. Amer. Lepid., no. 5274, 1903.

Laspeyresia lunatana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7225, 1917.

A somewhat variable species as far as color of hind wings and size are concerned. In some specimens the hind wing is distinctly whitish toward base; in others it is evenly dark throughout. The aedoeagus is very long and stout as compared with the rest of the male genitalia. The cornuti consist of several deciduous and two slender, straight fixed spines, the latter nearly as long as the aedoeagus. The decidedly slanting termen of forewing distinguishes it from *imitativa* and *conversana* which it most resembles.

Hind wing with veins 3 and 4 connate.

Genitalia figured from specimens in National Collection from San Luis Obispo (A. H. Vachell, March, male) and Los Angeles, Calif. ("Coquillet, No. 149," female).

Distribution.—Colorado, California, Washington, British Columbia, Alberta, Saskatchewan, Manitoba.

Alar expanse.—10–15 mm.

Type.—In British Museum.

Type locality.—North Oregon.

12. GRAPHOLITHA ECLIPSANA Zeller

(Figs. 124, 302)

Grapholitha (*Ephippiphora*) *eclipsana* Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 298.

Enarmonia eclipsana Kearfott, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 159.

Laspeyresia eclipsana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7216, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 393.

A striking species easily distinguished by its shining white, apically dark dusted hind wings. Not to be confused with anything else.

Hind wing with veins 3 and 4 connate.

Genitalia figured from specimens in National Collection from Oak Station, Pa. (F. Marloff, "IV-17-15," male and female).

Distribution.—North Carolina, Virginia, Maryland, Pennsylvania, New York, Ohio.

Alar expanse.—9–15 mm.

Type.—In Museum of Comparative Zoology.

Type locality.—Texas.

Group B.—Ocelloid Patch of Fore Wing Consisting of a Single Vertical Metallic Bar or a Pair of Closely Appressed Vertical Bars

13. GRAPHOLITHA INTERSTINCTANA (Clemens)

(Figs. 139, 306)

Stigmonota interstinctana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 351.

Dichrorampha scitana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 413.

Grapholitha distema Grote, Bull. Buffalo Soc. Nat. Sci., vol. 1, 1873, p. 92.

Grapholitha (*Ephippiphora*) *interstinctana* Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 296.

Enarmonia interstinctana Fernald, in Dyar list N. Amer. Lepid., no. 5270, 1903.—Folsom, Bull. 134, Illinois Agr. Exp. Sta., 1909, p. 134.

Laspeyresia interstinctana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7210, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 393.

A well known clover insect. The life history and a bibliography of the principal references are given in Folsom's bulletin.

Genitalia figured from specimens in National Collection from District of Columbia ("No. 82, in flower head of red clover, iss. July 2, 79," male) and Plummer Island, Md. (Busck, Aug. 1903, female). Bursa of female without signa. Hind wing with veins 3 and 4 connate.

Distribution.—North Carolina, Virginia, Maryland, District of Columbia, Pennsylvania, New Jersey, New York, New Hampshire,

Vermont, Minnesota, Iowa, Illinois, Missouri, Ontario, Quebec, Alberta.

Alar expanse.—7–12 mm.

Types.—In Academy Natural Sciences, Philadelphia (*interstinctana*); British Museum (*scintana* and (?) *distema*).

Type localities.—Pennsylvania (*interstinctana*); "North America" (*scintana*); New York (*distema*).

Food plants.—*Trifolium* (larvae in flower heads and stems).

14. GRAPHOLITHA EDWARDSIANA (Kearfott)

Enarmonia edwardsiana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 58.

Laspeyresia edwardsiana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7218, 1917.

Represented so far only by the cotypes in the American Museum and Barnes collections and a specimen from the Fernald collection (California) in the National Museum. I am unable to find the cotype which Kearfott states was deposited in the National Collection.

Very similar in pattern and structure to *lana* Kearfott from which it differs in its distinctly white hind wing cilia; *lana* is probably either a synonym or a local race.

Hind wing with veins 3 and 4 connate.

Genitalia as in *lana*.

Alar expanse.—14 mm.

Type.—In American Museum.

Type locality.—California.

15. GRAPHOLITHA LANA (Kearfott)

(Figs. 137, 308)

Enarmonia lana Kearfott, Trans. Amer. Ent. Soc., vol. 38, 1907, p. 59.

Enarmonia placerana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 60.

Enarmonia vancouverana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 63.

Enarmonia chrysotypa Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Laspeyresia lana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7219, 1917.

Laspeyresia placerana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7221, 1917.

Laspeyresia vancouverana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7212, 1917.

Variable in size and character of the dorsal geminate markings of fore wing. Typical *lana* has four white dorsal dashes and typical *placerana* and *vancouverana* two; but in a large series of moths in the Barnes Collection from Loma Linda, Calif. ("July 24–31"), and several specimens from Mineral King, Calif. ("July 1–7"), there is every gradation, some specimens showing two distinct lines,

others two lines partially divided by dark scaling, and still others with the normal two lines so completely broken as to make four. If the names were kept separate it would be impossible to decide under which many specimens would go. In fact, the Kearfott paratype of *placerana* in the National Collection has four distinct white marks and agrees more closely with his type of *lana* than with any of the other types of *placerana*. There are some differences in the size and shape of the harpes of the male genitalia between the actual types of *placerana* and *vancouverana;* but in a series of moths from Goldstream, British Columbia, all collected upon the same day (June 1, 1921) the intergrades are such that it is impossible to tell under which name some of the specimens should go if the two names are to be kept separate. The species is probably a stem borer or seed-capsule feeder, which habit would easily account for the variability. A reared series of *S. tristrigana* shows quite as much variation. I am of the opinion that *lana* is only a race of *edwardsiana*, from which it differs chiefly in the darker cilia of its hind wing, not a good character. This synonym, however, will have to wait upon rearings before it can be definitely settled.

Hind wing with veins 3 and 4 connate.

Genitalia figured from specimens in National Collection from Placer County, Calif. ("June," male cotype of *placerana*), and Goldstream, British Columbia ("1–VI–21, E. H. Blackmore, No. 428," female).

Distribution.—California, British Columbia.

Alar expanse.—10–15 mm.

Types.—In American Museum.

Type localities.—Colfax, Placer County, Calif. (*lana* and *placerana*); Wellington, British Columbia (*vancouverana*).

16. GRAPHOLITHA DYARANA (Kearfott)

(Fig. 135)

Enarmonia dyarana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 58.
Laspeyresia dyarana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7217, 1917.

Females of this species average somewhat larger than *lana* and show some slight differences in genitalia, having the chitinization about genital opening much weaker. It is probable that the two are only racially distinct. The determination of this, however, will have to wait upon rearings.

Female genitalia figured from type. Male genitalia as in *lana*.

All specimens in the collections are from Colorado localities.

Alar expanse.—16–17 mm.

Type.—In American Museum.

Type locality.—Colorado.

17. GRAPHOLITHA TRISTRIGANA (Clemens)

(Figs. 136, 307)

Stigmonota tristrigana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 133.

Enarmonia tristrigana Fernald, in Dyar List N. Amer. Lepid., no. 5275, 1903.

Enarmonia saundersana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 63.

Laspeyresia saundersana Barnes and McDunnough, Check List, Lepid. Bor. Amer. no. 7215, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 393.

Laspeyresia tristrigana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7220, 1917.—Heinrich, U. S. Journ. Agr. Res., vol. 20, 1921, p. 824.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

Kearfott's types of *saundersana* are simply runted specimens of *tristrigana*. We have a considerable series of the latter reared from both *Baptisia* and *Lupinus* and among the lot are several specimens agreeing in every detail with typical *saundersana* as well as specimens intergrading in size between it and typical *tristrigana*. There are no structural differences.

Hind wing with veins 3 and 4 connate.

Genitalia figured from specimens in National Collection from El Vista, Tex. (reared from seed pods of *Baptisia* May 15, 1919, Heinrich, male and female). Bursa of female without signa.

Distribution.—Illinois, Kansas, Oklahoma, Alabama, Texas, Florida, North Carolina, Pennsylvania, New Jersey, New York, Massachusetts, Ontario.

Alar expanse.—10–16 mm.

Types.—In Academy Natural Sciences (*tristrigana*); American Museum (*saundersana*).

Type localities.—Virginia (*tristrigana*); Toronto, Ontario, Canada (*saundersana*).

Food plants.—*Baptisia*, *Lupinus* (larvae in seed pods and stems).

10. OFATULENA, new genus

(Figs. 30, 119)

Genotype.—Grapholitha? duodecemstriata Walsingham (North America).

Thorax smooth.

Fore wing smooth; termen straight or very slightly concave; 12 veins; 7 to termen; 11 from cell at middle; 10 rather well separated from 9; upper internal vein of cell from between 10–11; 3, 4 and 5 parallel from beyond cell, not approximate at termen; 2 from cell at ⅔, straight; no costal fold in male.

Hind wing with normal pecten; 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; inner margine simple in male.

Hind tibia smooth scaled.

Male genitalia with a row of long stout, flattened marginal spines at lower outer angle of harpe; cucullus densely spined; basal opening greatly enlarged; no appreciable neck incurvation; sacculus reduced, sparsely haired. Uncus absent. Socii represented as heavy hair tufts at extremity of tegumen. Gnathos poorly defined, weakly chitinized. Aedaeagus long, slender, straight; conuti absent.

Abdomen of male simple.

Female genitalia with two signa developed as short thorn-like spines. Ductus bursae moderately long, unchitinized. Bursa copulatrix roughly triangular, smooth. Genital plate absent.

A small North American genus affiliated with *Laspeyresia*.

KEY TO THE SPECIES OF OFATULENA

1. Basal half of fore wing whitish gray, finely cross marked with fuscous; ground color of ocelloid patch whitish; hind wing blackish fuscous. (1) duodecemstriata.

Basal half of fore wing grayish fuscous, unmarked by transverse lines; ground color of ocelloid patch ocher yellow; hind wing dark smoky brown. (2) luminosa.

1. OFATULENA DUODECEMSTRIATA (Walsingham)

(Figs. 30, 119, 309)

Grapholitha? duodecemstriata Walsingham, Trans. Ent. Soc. London, 1884, p. 146.

Enarmonia duodecemstriata Fernald, in Dyar List N. Amer. Lepid., no. 5284, 1903.

Laspeyresia duodecemstriata Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7240, 1917.

A beautiful species easily recognized by its whitish gray, finely cross-striped fore wing with large many striped ocelloid patch and its black brown hind wing.

Genitalia figured from specimens in National Collection from Tempe, Ariz. ("July 19, 20," male) and La Puerta, Calif. ("July, 1911, Wright and Field," female).

Distribution.—Texas, Arizona, Utah, Nevada, California.

Alar expanse.—14–17 mm.

Type.—In British Museum.

Type locality.—Arizona.

Food plant.—Mesquite beans.

2. OFATULENA LUMINOSA, new species

(Figs. 120, 310)

Palpus white. Face white. Head pale ocher yellow shading to white in center. Thorax fuscous gray; tegula paler, whitish gray;

collar white. Fore wing grayish fuscous; at extreme base a few whitish scales and on mid dorsum a pair of very faint pale gray outwardly curved dashes extending upward to cell; ocelloid patch consisting of two vertical leaden metallic bars (the outer slanting inward a little and parallel to termen) inclosing a varying number of fine irregular black dots or streaks upon an ocher yellow ground; subcostal area above ocelloid patch ocher yellow; from costa just beyond middle a narrow metallic outwardly slanting bar, joining inner vertical bar of ocellus; beyond this four pairs of very short, narrow, white, geminate dashes, from the second of which extends a thin metallic bar (parallel to the inner one from costa) and joining outer vertical bar of ocellus; a similar, short, curved metallic line from outer pair of white costal dashes; apex and terminal area beyond ocellus, grayish fuscous with scale ends white; cilia leaden fuscous, semimetallic. Hind wing dark smoky brown, paler toward base; cilia white with a dark basal band.

Male genitalia figured from type; female from paratype in National Collection.

Alar expanse.—12–14 mm.

Type.—In American Museum.

Paratype.—Cat. No. 28015, U.S.N.M.; also in collection Barnes.

Type locality.—Brownsville, Tex.

Described from male type from Brownsville, Tex. (Townsend, "19 June, 95"); and four female paratypes from San Benito, Tex., dated "Apr. 1–7," "Apr. 24–30," and "Sept. 8–15."

Close to *duodecemstriata* but distinct and easily separated on color and structure; in *luminosa* the aedoeagus of the male is shorter and stouter than in *duodecemstriata;* the large outer spines of harpe are also more thickly clustered (in the photograph they do not show well as most of them were broken off before the slide was made).

The male type had been identified by Kearfott as "*Pammene texanana* Walsingham" and was in the American Museum under that name.

11. Genus LASPEYRESIA Hübner

Laspeyresia Hübner, Verz. Schmet., 1826, p. 381.
Genotype.—Tortrix corollana Hübner (Europe).
Endopsia Guenée, Eur. Microlepid. Index Method., 1845, p. 48.
Genotype.—Pyralis nigricana Stephens (Europe).
Cerata Stephens, List Brit. Animals, pt. 10, Lepid., 1852, p. 77.
Genotype.—Penthina servillana Duponchel.

Characters as in *Grapholitha* except:

Fore wing with termen concave, straight or convex; veins 3, 4 and 5 separate or slightly approximate at termen.

Hind wing with 3 and 4 connate, stalked or united; inner margin, in male, sometimes with rought sex scaling; male rarely with a slight fold along vein 1*c* inclosing or partially inclosing the pecten from lower median vein.

Abdomen of male simple.

KEY TO THE SPECIES OF LASPEYRESIA

1. Fore wing with a broad well-defined median or antemedian transverse fascia; or a whitish suffusion at middle extending from dorsum to costa and much extended on latter; or with basal half of wing whitish ..... 2.
   Fore wing otherwise ..... 9.
2. Antemedian pale area of fore wing distinguished as a broad fascia bounded inwardly and outwardly by narrow metallic bands extending from costa to dorsum ..... 3.
   Pale area covering a greater part of basal half of wing; when defined as an antemedian fascia, not bounded by metallic bands ..... 4.
3. Antemedian fascia whitish ocherous, strongly contrasted against dark basal and median areas ..... (21) tana.
   Antemedian fascia grayish ocherous only slightly paler than basal band and median areas ..... (22) cupressana.
4. Thorax and extreme base of fore wing concolorous with antemedian pale area ..... (20) fletcherana.
   Thorax and extreme base of fore wing darker than antemedian area ..... 5.
5. Dark basal patch of fore wing distinct only to top of cell; costa at base white and but faintly marked by dark scaling; hind wing white at base ..... 6.
   Basal patch complete to costa; costa at base dark or very strongly marked with dark scaling; hind wing not white at base ..... 7.
6. Thorax white with a dark narrow transverse median band; entire patagia white; alar expanse less than 14 mm ..... (25) gallaesaliciana.
   Thorax black with white dusting on posterior half; patagia with a blackish shade on anterior margin; alar expanse over 15 mm ..... (26) lautiuscula.
7. Basal patch leaden fuscous or semilustrous fuscous drab ..... 8.
   Basal patch blackish ..... (27) flexiloqua.
8. Dark terminal area of fore wing strongly dusted with black; longitudinal black streaks of ocelloid patch not sharply defined, more or less fused into the black dusting of the entire terminal area ..... (24) leucobasis.
   Dark terminal area with only scattered black dustings; longitudinal black streaks of ocelloid patch sharply defined and interspaced with ocherous fuscous ..... (23) prosperana.
9. Fore wing with greater part of costal area white ..... (14) populana.
   Fore wing with greater part of costal area gray or brown ..... 10.
10. Terminal area of fore wing pink or red ..... 11.
    No pink or red shading in terminal area ..... 12.
11. Terminal area pink; ocelloid patch consisting of a single vertical leaden metallic bar inwardly margined by a narrow blackish fuscous shading and (on its upper half) by a second narrow metallic bar ..... (30) ninana.
    Terminal area red; ocelloid patch consisting of two vertical bronzy metallic bars inclosing six or seven longitudinal blackish fuscous streaks upon a white ground ..... (29) flavicollis.

12. Fore wing with a single, conspicuous, undivided white spot on mid dorsum ---- 13.
Fore wing without such; white dorsal markings when present consisting of a pair of geminate marks or a white line bordering a narrow transverse metallic bar ---- 14.
13. White dorsal spot not extending above vein 1*b*; ground color of fore wing to naked eye, dark gray; a conspicuous black spot on mid costa; hind wing white toward base ---- (13) albimaculana.
White dorsal spot extending up into cell; ground color of fore wing to naked eye, dark purplish brown; no such black spot on mid costa; hind wing brown throughout ---- (28) americana.
14. Fore wing grayish ocherous, vertically marked by broken leaden-metallic bars ---- (31) colorana.
Fore wing otherwise ---- 15.
15. General color of fore wing, gray ---- 16.
General color of fore wing, brown ---- 20.
16. Hind wing distinctly white toward base ---- 17.
Hind wing not appreciably whitish toward base ---- 18.
17. Three pairs of outer-costal white geminate marks equidistant. (11) multilineana.
Third (apical) pair of outer-costal white geminations well separated from other two ---- (12) ingrata.
18. Dorsum of fore wing at extreme base dark, unmarked by white geminations ---- (10) membrosa.
Several white geminate marks on base of dorsum, or a white shade extending along dorsum to base from median dorsal geminate marks ---- 19.
19. Ocelloid patch containing three distinct longitudinal black streaks. (8) larimana.
No black streaks in ocelloid patch ---- (9) garacana.
20. Fore wing with a widely spaced pair of narrow, strongly marked, metallic transverse bands; one near and the other beyond middle ---- 21.
Fore wing without such ---- 23.
21. First transverse metallic band inwardly margined with white. (32) erotella.
First transverse band not margined with white ---- 22.
22. Hind wings very dark brown; cilia cream white, strongly contrasted against wing ---- (36) miscitata.
Hind wing rather pale brown; cilia whitish but not strongly contrasted. (33) toreuta. (34) ingens. (35) piperana.
23. Fore wing with a pair of white geminate dashes on dorsum near middle ---- 24.
Fore wing without white markings on dorsum; dorsal geminate marks when present, leaden metallic ---- 29.
24. Thorax and base of fore wing as dark as darkest outer shade of wing. (3) laricana.
Thorax and base of fore wing paler than outer dark shading of wing ---- 25.
25. Ocelloid patch containing only two longitudinal black dashes. (7) parmatana.
Ocelloid patch containing four or more longitudinal black dashes ---- 26.
26. Fore wing heavily dusted with black beyond base ---- (6) obnisa.
Fore wing with little or no black dusting beyond base ---- 27.

27. Seven white geminate marks on costa ..... (4) rana.
Ten white geminate marks on costa ..... 28.
28. Alar expanse under 15 mm ..... (1) bracteatana.
Alar expanse over 15 mm ..... (2) cornutana.
29. Hind wing blackish brown, much darker than fore wing; hind wing cilia snow white with no dark basal band ..... (18) grandicula.
Hind wing brown, sometimes quite dark, but not distinctly darker than fore wing; cilia more or less white but always with dark basal band ..... 30.
30. Fore wing with a pair of mid dorsal metallic geminate marks (or a single metallic spot) fusing above with a similar pair from costa beyond base to form a faint but distinguishable angulate metallic fascia ..... 31.
Fore wing without such ..... 33.
31. Hind wing with veins 3 and 4 united ..... (5) inopiosa.
Hind wing with veins 3 and 4 connate or stalked ..... 32.
32. Fore wing with median brown area between costa and dorsum heavily dusted with black; outer half of costa with four to six whitish geminate dashes; alar expanse less than 12 mm ..... (15) youngana.
Fore wing with scales of median brown area between costa and dorsum tipped with ochreous, no appreciable black dusting; outer half of costa with eight or nine whitish geminate dashes; alar expanse 12 mm. and over ..... (17) candana.
33. Termen of fore wing concave; veins 3 and 4 bent upward at middle; hind wing whitish on costa ..... (19) caryana.
Termen of fore wing convex; veins 3 and 4 not bent upward at middle; hind wing not whitish on costa ..... (16) nigricana

1. LASPEYRESIA BRACTEATANA (Fernald)

(Figs. 311, 312)

Grapholitha bracteatana Fernald, Rep. U. S. Dept. Agr. for 1880, 1881, p. 265.

Enarmonia bracteatana Fernald, in Dyar List N. Amer. Lepid., no. 5271, 1903.

Laspeyresia bracteatana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7222, 1917.

Laspeyresia pallidibasalis Heinrich, Proc. U. S. Nat. Mus., vol. 57, 1920, p. 60.

When I described *pallidibasalis* I distinguished it from *bracteatana* by its size and a difference in genitalia. In a large reared series the specimens averaged larger than Fernald's types and showed a deeper emargination of the harpe. These differences, I am now convinced are not significant. The Fernald types are runted specimens; and while they differ from typical, or average *pallidibasilis*, in the characters mentioned, they do agree very well with occasional small specimens of the latter. I am therefore sinking my name.

Male genitalia figured from paratypes of *bracteatana* and *pallidibasalis* in the National Collection. These photographs show the extreme differences in harpe shape. Cornuti a dozen or more short fixed spines arranged in a row. The female genitalia are as in variety *cornutana* Dyar.

Veins 3 and 4 of hind wing stalked.

Distribution.—California and Oregon.

Alar expanse.—9–14 mm.

Types.—In National Collection.

Type localities.—Jolon, Calif. (*bracteatana*); Kaolin Beds, Oreg. (*pallidibasalis*).

Food plant.—*Abies concolor* (Larvae feed in cones or bracts and seeds).

2. LASPEYRESIA BRACTEATANA CORNUTANA (Dyar)

(Fig. 151)

Epinotia cornutana Dyar, Proc. Ent. Soc. Washington, vol. 5, 1903, p. 231.
Enarmonia cornutana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7166, 1917.

The only specimen of this I have seen is the female type. It has nothing to separate it from *bracteatana* except its larger size and darker banding (somewhat heavier chitinization) of the abdominal segments, a character not visible until the abdomen is completely denuded. For the present the name should be retained. It probably designates a good food plant or local race.

Genitalia figured from type.

Alar expanse.—17 mm.

Type.—In National Collection.

Type locality.—Williams, Ariz.

3. LASPEYRESIA LARICANA (Busck)

(Figs. 155, 317)

Laspeyresia laricana Busck, Proc. Ent. Soc. Washington, vol. 18, 1916, p. 152.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7251–1, 1917.

This and the following two species are cambium miners in the bark of coniferous trees. They are very similar and possibly only food plant races of a single variable species. Further rearing will be necessary to determine this. The pattern differences are shown in the figures. The female of *laricana* has the genital opening larger and the genital plate more strongly chitinized than those of the others. The male has the aedoeagus quite stout, straight, and not perceptibly tapered; the cornuti are arranged in three clusters of stout fixed spines, some very short and some moderately long.

Hind wing with veins 3 and 4 connate or stalked.

Genitalia figured from specimens in the National Collection from Missoula (male, reared under Hopk. U. S. No. 11551, May, 1913, from larva in cambium of Douglas fir, J. C. Brunner, collector) and Evaro, Montana (female type, reared under Hopk. U. S. no. 12330, May 5, 1914).

Specimens in National Collection and collection Barnes from Montana.

Alar expanse.—14.5–16.5 mm.

Type.—In National Collection.

Type locality.—Evaro, Mont.

Food plants.—*Larix occidentalis*, *Pseudotsuga taxifolia.*

4. LASPEYRESIA RANA Forbes

(Figs. 153, 314)

Laspeyresia rana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

Kearfott had a single female under the above name in his collection but had never published a description; so the species will have to be credited to Forbes. It is similar to *laricana* Busck; but with paler thorax and base of forewing; ocelloid patch containing 4 longitudinal black streaks; veins 3 and 4 of hind wing connate.

Genitalia figured from specimens in National Collection from Missoula, Mont. (reared under Hopk. U. S. Nos. 11081 and 11082, May 15 and June 1, 1915, from larvae feeding in bark of *Picea engelmanni*, B. T. Harvey, collector). Male genitalia like those of *bracteatana* except: aedoeagus stout, bottle necked toward apex; cornuti a double row of 8 to 10 short, weak, fixed spines.

Distribution.—North Carolina, Montana, Alberta, Ontario. The specimens from Alberta (Nordegg) are a trifle darker than the others but otherwise agree.

Alar expanse.—13–14 mm.

Type.—In American Museum.

Type locality.—Black Mountains, N. C.

Food plant.—*Picea engelmanni.*

5. LASPEYRESIA INOPIOSA, new species

(Fig. 165)

Similar to the preceding (*rana*) except:

Fore wing with geminate marks on dorsum, broad, leaden scaled; eight (rather than seven) white geminate marks on costa; ocelloid patch with two broken black longitudinal dashes set close together near top or with two or three black dots in place of the usual black lines; veins 4 and 5 closely approximate at termen.

Hind wing with veins 3 and 4 united; underside of wing (in male) rough scaled toward base.

Female genitalia of type figured.

Alar expanse.—9–11 mm.

Type and *paratype.*—Cat. No. 28016, U.S.N.M.

Type locality.—Coeur d'Alene, Idaho.

Food plant.—*Pinus contorta.*

Described from female type and male paratype (latter without abdomen) reared May 11, 1916, under "Hopk. U. S. No. 13958–2," from larvae feeding in twigs of *Pinus contorta* infested by *Petrova albicapitana*, taken at the type locality by J. C. Evendon.

6. LASPEYRESIA OBNISA, new species

(Fig. 164)

Similar to *bracteatana* Fernald but with darker wings, dorsal geminations of fore wing broader and more fused, a narrow border of ocherous fuscous scaling along termen, and different genitalia.

Palpus and face sordid whitish ocherous. Head, thorax, and fore wing a semilustrous leaden drab. Fore wing with termen slightly concave below apex; blackish fuscous, with some dusting of ocherous fuscous on outer half; from mid dorsum a broad pair of white geminate dashes, fused at base and extended as bluish metallic streaks to top of cell; from costa before middle a pair of short, obscure, white dashes ending in bluish metallic scales but not fusing with the dorsal patch; on costa beyond middle three pair of short white streaks (repeated upon under surface of wing), and continued in bluish metallic streaks to the vertical bars of ocelloid patch, the outer pair well separated from the other two and close to apex; ocelloid patch consisting of two vertical metallic bars inclosing five or six longitudinal black lines interspaced with ocherous fuscous scaling; termen narrowly bordered with ocherous fuscous; cilia leaden fuscous with a black basal line; this black line and the inner ocherous margin of termen cut below apex and above tornus by white spots reproduced on under surface of wing. Hind wing dark brown; cilia whitish with dark basal band; undersurface of wing distinctly paler toward base; veins 3 and 4 stalked.

Female genitalia of type figured.

Alar expanse.—15–16 mm.

Type and *paratype.*—Cat. No. 28017, U.S.N.M.

Type locality.—Fraser Mills, British Columbia.

Described from female type and paratype from the type locality ("16-VI-1922" E. H. Blackmore and "30-VII-22" L. E. Marmont); one female paratype from Brentwood, British Columbia ("14-VII-23" Blackmore); and one female paratype from Mount Newton, British Columbia ("1-VIII-20" Blackmore); all received under Blackmore No. 472.

7. LASPEYRESIA PARMATANA (Clemens)

Ephippiphora parmatana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 352.

Enarmonia parmatana Fernald, in Dyar List N. Amer. Lepid., no. 5283, 1903.

Laspeyresia parmatana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7239, 1917.

In the Academy of National Sciences at Philadelphia there is a male which Fernald had labeled as possibly the Clemens type. It is a *Thiodia* of the *crispana-alterana* group. This, however, can not be the type, as Clemens takes pains to give details of the venation, which show plainly that his species is a *Laspeyresia*: "in the medium vein" of hind wing, he says, "the *upper nervula is forked remotely* from the insertion of the medio discal." This rules out the aforementioned *Thiodias* which all have vein 5 very closely approximate to the stalk of 3 and 4 at base. Forbes [9] applied the name to what we have been calling *Thiodia crispana* Clemens, misunderstanding, I think, Clemens' venational terminology.

The only thing I have seen that answers at all to Clemens' description is *inopiosa* Heinrich; but this is a western species which probably does not occur east of the Rockies. Kearfott had a number of specimens under the name, only one of which is a *Laspeyresia*, and it does not fit the description; the head is too pale and the thorax too heavily dusted with white. Clemens' description will apply only to an eastern *Laspeyresia* with whitish palpi, dark brownish head, thorax, and wings, a white divided dorsal mark on fore wing, four pairs of white costal geminations, an ocelloid patch containing two longitudinal black streaks upon a pale ground somewhat dusted with ocherous scaling, and with veins 3 and 4 of hind wing stalked. I have seen no such specimen in any of our collections.

Alar expanse.?—(not given).

Type.—Lost.

Type locality.—Pennsylvania.

8. LASPEYRESIA LARIMANA (Walsingham)

(Fig. 316)

Eucelis larimana Walsingham, Trans. Ent. Soc. London, 1895, p. 518.
Enarmonia larimana Fernald, in Dyar List N. Amer. Lepid., no. 5286, 1903.
Laspeyresia larimana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7242, 1917.

The only thing I have seen that matches Walsingham's description is the specimen Kearfott had under *parmatana*. It is a male, originally from the Deitz collection, without locality and labeled simply, "in timber, 6–14–01." Its size is about right (13 mm.), and in pattern and color it agrees in detail with the description of *larimana*. I take it to be that species.

Male genitalia figured.

Hind wing with veins 3 and 4 stalked.

Alar expanse.—14.5 mm.

Type.—In British Museum.

Type locality.—Loveland, Colo.

[9] Memoir 68, Cornell Univ. Agr. Expt. Sta., 1924, p. 432.

9. LASPEYRESIA GARACANA (Kearfott)

(Figs. 143, 313)

Enarmonia garacana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 66.
Enarmonia septicola Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.
Laspeyresia garacana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7249, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

Close to *larimana* Walsingham; differing in genitalia and the absence of black markings from ocelloid patch.

Veins 3 and 4 of hind wing stalked.

Male and female genitalia figured from paratypes in National Collection and American Museum from the type localities.

Aedoeagus slender, tapering; cornuti a half dozen very small, thin attached spines placed in a row.

Distribution.—Texas, Illinois, Ontario.

Alar expanse.—14–15 mm.

Type.—In American Museum.

Type locality.—Chicago, Ill.

10. LASPEYRESIA MEMBROSA, new species

(Figs. 150, 322)

Antenna grayish, dusted with black toward base. Palpus sordid white; third joint rather long, porrected and exposed. Face and head whitish, latter dusted with gray toward sides. Thorax grayish fuscous dusted with whitish scales. Fore wing with termen straight; veins 3, 4, and 5 not approximate at termen; color grayish fuscous with white markings and dusting, making the general color a rather ashy gray; 14 to 16 paired, evenly spaced, very fine and obscure white costal geminations; on mid dorsum two obscure geminate white marks; some whitish dusting, continuing from extremities of these to costa, forms an obscure pale antemedian fascia defining a dark basal patch, outwardly angulate and somewhat excavate below middle; post median area grayish fuscous, appearing to the naked eye as an indistinct dark fascia; ocelloid patch and apical area dusted with whitish; ocellus defined by two vertical metallic bars enclosing two or three abbreviated black dashes; from outer white costal geminations two obscure leaden lines extending, one to inner vertical bar of ocellus, the other to termen below apex; at apex a round dark spot; cilia leaden gray with a black basal line peppered with white. Hind wing pale smoky fuscous; cilia paler with a dark basal band; veins 3 and 4 connate.

Male genitalia figured from paratype in American Museum from Brownsville, Tex.; female from type in National Collection. The aedoeagus of the male is very long, slender and sharply bent near

middle, scarcely tapering. Signa of female two long slender curved thorns.

Alar expanse.—12–16 mm.

Type and *paratypes.*—Cat. No. 28018, U.S.N.M.; paratypes also in American Museum and Collection Barnes.

Type locality.—San Antonio, Tex.

Food plant.—Prosopis.

Described from female type and one paratype from the type locality reared from larvae feeding in pods of Mesquite ("6–29–17," Busck); one female paratype from Brownsville, Tex. ("June"); one female paratype from Kerrville, Tex. ("May, 06", F. C. Pratt); three male and two female paratypes from Hot Springs, Ariz. ("from Mesquite, 26–6"); three male and one female paratypes from Baboquivari Mountains, Pima County, Ariz. ("July 15–30, 1903," O. G. Poling); one female paratype from Baboquivari Mountains, Ariz. (O. G. Poling, "15–30 April, 1921"); one male paratype from La Puerta Valley, California ("July, 1911," Geo. H. Field); two male paratypes from Charlestown Mountains, southern Nev. ("O. G. Poling, 1–15 July, 1921"); and one male paratype from Clark County, Nev. ("May 16–23").

The reared specimens had been in the National Collection for some time unnamed. Part of the series from the Baboquivari Mountains had been set aside by Kearfott as a new species.

11. LASPEYRESIA MULTILINEANA (Kearfott)

(Fig. 318)

Enarmonia multilineana KEARFOTT, Journ. New York Ent. Soc., vol. 16, 1908, p. 178.

Laspeyresia multilineana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer. no. 7250, 1917.—FORBES, Memoir 68, Cornell Univ. Agr. Expt. Sta., 1924, p. 394.

I have seen no females of this species. The male genitalia are similar to those of *populana* Busck; but the two species are quite different in pattern. Termen of fore wing straight and decidedly slanting. Hind wing with veins 3 and 4 stalked or connate.

Male genitalia figured from paratype in National Collection from type locality ("26–VI–05," Criddle).

Distribution.—New York, Manitoba.

Alar expanse.—12.5–14 mm.

Type.—In American Museum.

Type locality.—Aweme, Manitoba.

12. LASPEYRESIA INGRATA, new species

(Fig. 315)

Closely resembling *multilineana*, but with quite different genitalia. The coastal geminations of fore wing before middle are more dis-

tinct and, with the white dorsal marks, form an obscure pale fascia which defines a dark basal patch; the dark postmedian area is also defined as a rather indistinct fascia; and the apical pair of white costal geminations are further removed from the others than in *multinineana*.

Palpus and face grayish fuscous, slightly dusted with whitish. Head and thorax fuscous gray; tegula shading to white at tip. Fore wing fuscous gray; four narrow, rather long, white geminate marks on middle of dorsum, with a few shorter, fainter white markings anterior to them on dorsal margin; costa with five pairs of white dashes, two pair before middle, two beyond, and one near apex; ocelloid patch consisting of two vertical leaden bars inclosing two faint, longitudinal black lines; above, a third faint black streak; termen edged with black with a white spot below apex and two or three, more or less fused, white spots at tornus; cilia leaden fuscous. Hind wing white toward base, smoky fuscous toward apex; cilia white with a dark basal band; veins 3 and 4 connate or very short stalked.

Male genitalia of type figured; aedoeagus stout, bottle necked toward apex; cornuti, eight short stout fixed spines arranged in a row.

Alar expanse.—10–13 mm.

Type.—Cat. No. 28019, U.S.N.M.

Paratype.—In collection Barnes.

Type locality.—Aweme, Manitoba.

Described from male type from Aweme, Manitoba ("25–V–05," Criddle), and one male paratype from Colfax, Placer County, Calif. ("VII," A. H. Vachell).

13. LASPEYRESIA ALBIMACULANA (Fernald)

(Fig. 147)

Grapholitha albimaculana Fernald, Can. Ent., vol. 11, 1879, p. 157.

Enarmonia albimaculana Fernald, in Dyar List. N. Amer. Lepid., no. 5273, 1903.

Enarmonia articulatana Kearfott, Journ. New York Ent. Soc., vol. 16, 1908, p. 177.

Laspeyresia albimaculana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7224, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 395.

Laspeyresia articulatana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7251, 1917.

An easily recognized species. Fore wing gray with a round, undivided shining white spot on mid dorsum and a conspicuous sharply contrasted black spot on middle of costa. Hind wing with veins 3 and 4 short stalked or connate.

Kearfott's *articulatana* is an obvious synonym.

Female genitalia figured from specimen in National Collection from North Evanston, Ill. (A. Kwiat, "V–18–13"). I have seen no males.

Distribution.—Maine, Ohio, Illinois.

Alar expanse.—11.5–13.5 mm.

Types.—In National Collection (*albimaculana*); in American Museum (*articulatana*).

Type localities.—Orono, Me. (*albimaculana*); Cincinnati, Ohio (*articulatana*).

14. LASPEYRESIA POPULANA Busck

(Figs. 145, 319)

Laspeyresia populana Busck, Proc. Ent. Soc. Washington, vol. 18, 1916, p. 151.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7236–1, 1917.

A somewhat variable but easily recognized species. The genitalia are similar to those of *multilineana;* but the pattern is quite different.

Genitalia figured from paratype (male) and type (female) in National Collection (reared under Hopk. U. S. no. 12339b, June 15, 1914, from larvae mining cambium of bark of *Populus trichocarpa*, J. Brunner, collector).

Distribution.—Montana, Colorado, Manitoba, Alberta. There is also a male in the Cornell University collection from Ithaca, N. Y. ("11 July, 1916.")

Alar expanse.—11.5–14 mm.

Type.—In National Collection.

Type locality.—Missoula, Mont.

Food plant.—*Populus trichocarpa* (larva in bark).

15. LASPEYRESIA YOUNGANA (Kearfott)

(Figs. 138, 330)

Enormonia youngana Kearfott, Can. Ent., vol. 39, 1907, p. 1.

Laspeyresia youngana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7232, 1917.—Forbes, Memoir 68, Cornell Univ., Agr. Exp. Sta., 1924, p. 393.

A species of some economic importance as an enemy of spruce. The larvae feed in the cones upon the seeds and bracts. Rather widely distributed throughout the northern States and Canada. There are two generations annually; adults appearing in April–May and in August–September.

Genitalia figured from paratypes in National Collection from the type locality.

Distribution.—Ontario, Manitoba, Maine, Colorado, Montana, Oregon.

Alar expanse.—8–11 mm.

Type.—In the American Museum.

Type locality.—Ottawa, Canada.

Food plants.—*Picea alba*, *P. Sitchensis*, *Pinus pungens.*

16. LASPEYRESIA NIGRICANA (Stephens)

(Figs. 140, 328)

Pseudotomia nigricana Stephens, Illus. Brit. Ent., vol. 4, 1834, p. 101.

Semasia nigricana Fletcher, Ontario Exp. Farms Rep. for 1897, 1898, p. 194.—Chittenden, U. S. Dept. Agr. Bull., no. 33, 1902, p. 96; U. S. Dept. Agr. Bull., no. 66, pt. 7, 1909, p. 95.

Grapholitha nigricana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 2160, 1901.

Enarmonia dandana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 65.

Enarmonia ratifera Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Laspeyresia dandana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7234, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

Laspeyresia nigricana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7235, 1917.—Heinrich, Can. Ent., vol. 55, 1923, p. 13.—Fluke, Bull. 310, Agr. Exp. Sta. Wisconsin, April 1920.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 393.

Laspeyresia novimundi Heinrich, Can. Ent., vol. 52, 1920, p. 257.

Endopisa nigricana Pierce and Metcalfe, Genitalia Brit. Tort., 1922, p. 87, pl. 30.

The pea moth of economic literature, an introduced European species. Its life history is given in the department and State bulletins cited above. The type of Kearfott's *dandana* is a runted specimen and smaller than normal examples of *nigricana*, but in structure and pattern it agrees. In Europe it has several synonyms. These are omitted here as they have never appeared in our literature and have no reference to American localities. The larva feeds in the pods of garden and field peas and apparently has no other food plant.

Hind wing with veins 3 and 4 stalked.

Genitalia figured from specimens in National Collection from Sturgeon Bay, Wis., reared July 14, 1920, by C. L. Fluke.

Distribution.—New Jersey, Wisconsin, Washington, Manitoba, Alberta, Ontario, Nova Scotia.

Alar expanse.—12–14 mm.

Types.—In British Museum (*nigricana*); American Museum (*dandana*); National Collection (*novimundi*).

Type localities.—England (*nigricana*); Essex County Park, N. J. (*dandana*); Sturgeon Bay, Wis. (*novimundi*).

Food plant.—*Pisum.*

17. LASPEYRESIA CANDANA Forbes

(Figs. 152, 325)

Laspeyresia candana FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 394.

A brownish fuscous species with a paler brownish semilustrous median fascia and concolorous brown hind wings; veins 3 and 4 of hind wing stalked.

Forbes validated the Kearfott manuscript name; but did not designate types. I therefore do so here, restricting them to a series of 12 males and 2 females from Oak Station, Pa. (May 15 to 21, F. Marloff) which Kearfott had deposited under the name in the three collections.

In addition to these we have in the National Collection a male from Guy's Mills, Pa. (May 13, 1915, Heinrich), and a female from Cincinnati, Ohio ("IV–23–04," A. F. Braun).

Genitalia figured from type in American Museum (male) and paratype in National Collection (female). Aedoeagus stout; cornuti two parallel rows of short fixed spines.

Alar expanse.—12–16 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28020, U.S.N.M. Also in American Museum and collection Barnes.

Type locality.—Oak Station, Pa.

I refer the species to *Laspeyresia* with some hesitation. In pattern it is very close to *nigricana*, *grandicula*, and *caryana*. The male genitalia are most like those of *Carpocapsa pomonella*. It also shares a male character with *Carpocapsa* and *Melissopus* in the appressed pocket inclosing the median pecten on hind wing. The rough sex scaling on the inner margin of the hind wing also occurs in *caryana* and *nigricana* and in the species under *Melissopus*. Eventually it will probably have to have a separate generic designation; but at present I do not think this is justified.

18. LASPEYRESIA GRANDICULA, new species

(Fig. 320)

Similar to *candana* in pattern and color of fore wing; but somewhat darker and lacking the fine peppering of whitish scales, and with very different genitalia.

Antenna of male nearly smooth. Palpus sordid whitish; third joint dusky. Head brown. Thorax and fore wing semilustrous fuscous brown; an obscure angulate median fascia on fore wing, slightly paler than ground color and broadest toward dorsum; pale costal geminations indistinct, except four evenly spaced whitish dashes on

outer half of costa; ocelloid patch as in *candana;* cilia leaded fuscous somewhat shaded with paler scaling at tornus and with a black basal line bordering termen. Hind wing with dorsal margin concave; blackish brown, much darker than fore wing and (in male) with a large patch of jet black appressed sex scaling on disk; no sex scaling on inner margin; hair tuft on lower median vein and at base of vein 1^a, snow white; cilia shining snow white, without dark basal line; veins 3 and 4 connate. Underside of fore and hind wings very dark brown; a large patch of appressed black scales covering cell of fore wing in male.

Male genitalia of type figured; aedoeagus (omitted from figure) moderately stout, tapering; cornuti very minute, scarcely distinguishable.

Alar expanse.—16 mm.

Type.—Cat. No. 28021, U.S.N.M

Type locality.—Moutain Lake, Va.

Described from male type ("June 14–21, 1907," A. F. Braun).

A striking species easily recognized by its dark brown hind wing, snow-white hind wing cilia, peculiar male sex scaling and characteristic genitalia.

19. LASPEYRESIA CARYANA (Fitch)

(Figs. 146, 323)

Ephippiphora caryana FITCH, Third Rep. Ins. New York, 1856, p. 459.
Grapholitha caryae SHIMER, Trans. Amer. Ent. Soc., vol. 2, 1869, p. 394.
Enarmonia caryana FERNALD, in Dyar List N. Amer. Lepid., no. 5268, 1903.—BARNES and MCDONNOUGH, Check List Lepid. Bor. Amer., no. 7207, 1917.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 392.

A rather common insect in the eastern United States. The larvae feed in the husks and fruits of hickory and pecan nuts and sometimes do considerable damage. The moth resembles that of *candana* but is easily distinguished. The hind wing is whitish on upper basal half; and in the male there is considerable black scaling in the area occupied by the anal veins, on the dorsum of the first three abdominal segments and on the under surface of both fore and hind wings; the thick white male sex scaling on inner margin of the hind wing is also pronounced. Hind wing with veins 3 and 4 connate.

Genitalia figured from reared specimens in National Collection from District of Columbia ("1035 P, 16–July–94," male) and Cadet, Mo. ("467603, July, 2–90," female). Aedoeagus slender, tapering and forked (that is, having a lateral spur, as in some specimens of the genus *Melissopus*); cornuti not distinguishable.

Distribution.—New Jersey, Pennsylvania, District of Columbia, Maryland, Virginia, Georgia, Florida, Texas, Missouri.

Alar expanse.—9–15 mm.

Types.—In National Collection (*caryana*); location unknown (*caryae*).

Type locality.—New York (*caryana* and *caryae*).

Food plants.—Hickory, pecan.

20. LASPEYRESIA FLETCHERANA (Kearfott)

(Fig. 321)

Enarmonia fletcherana Kearfott, Can. Ent., vol. 39, 1907, p. 127.

Laspeyresia fletcherana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7246, 1917.—Forbes, Memoir 68, Cornell Univ. Agri. Exp. Sta., 1924, p. 395.

A strikingly marked species easily identified by pattern and genitalia. Hind wing with veins 3 and 4 short stalked. Aedoeagus long, slender; cornuti three clusters of short fixed spines.

Male genitalia figured from paratype in National Collection from the type locality ("18–VI–1905," C. H. Young). I have seen no females.

Specimens in National and Canadian National Collections, American Museum and collection Barnes from Ottawa, Canada.

Alar expanse.—12–14 mm.

Type.—In American Museum.

Type locality.—Ottawa, Canada.

21. LASPEYRESIA TANA (Kearfott)

(Figs. 156, 327)

Enarmonia tana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 62.

Enarmonia cirrhas Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Laspeyresia tana Barnes and McDunnough, Check List Lepid Bor. Amer., no. 7248, 1917.

Another striking species. Hind wing with veins 3 and 4 stalked. Aedoeagus of male stout, nearly straight; cornuti a cluster of 6 to 8 stout, moderately long, fixed spines and a half a dozen slender, longer, deciduous spines.

Genitalia figured from paratypes in National Collection from the type locality (A. H. Vachell, "VII").

Distribution.—California, Nevada.

Alar expanse.—12–15 mm.

Type.—In American Museum.

Type locality.—Colfax, Placer County, Calif.

22. LASPEYRESIA CUPRESSANA (Kearfott)

(Figs. 154, 326)

Cydia cupressana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 54.

Carpocapsa cupressana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7275, 1917.

Similar to the preceding (*tana*) in genitalia and pattern: but apparently distinct. The genitalia (male and female) are smaller, and the ocelloid patch and antemedian fascia of fore wing much paler.

Hind wing with veins 3 and 4 connate or short stalked.

Genitalia figured from reared specimens in National Collection from the type locality (Jan. 11 and 24, 1886).

Specimens in National Museum, American Museum, and collection Barnes from California.

Alar expanse.—12–15 mm.

Type.—In American Museum.

Type locality.—Alameda County, Calif.

Food plant.—*Cupressus macrocarpa* (larvae feeding upon the seeds).

23. LASPEYRESIA PROSPERANA (Kearfott)

(Figs. 144, 324)

Grapholitha succedana Walsingham (not Schiffermüller), Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 97.

Thiodia succedana Fernald, in Dyar List. N. Amer. Lepid., no. 5169, 1903.

Enarmonia prosperana Kearfott, Can. Ent., vol. 39, 1907, p. 128.

Eucosma succedana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7088, 1917.

Laspeyresia prosperana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7247, 1917.

What Walsingham determined as the European *succedana* from Oregon is undoubtedly what Kearfott described as *prosperana*. The two are very similar in pattern and genitalia; but appear to be distinct. Our American form must at the very least be kept as a separate race. It has the costa of the harpe much more strongly curved than has *succedana*, and the cucullus differently shaped. Each has a short prong arising from the side of the aedoeagus near middle, and the organ slender, tapering and decidedly curved.

Genitalia figured from specimens in National Collection from Field Brook, Calif. (H. S. Barber, "19–05–03," male), and Easton, Wash. (female paratype).

Distribution.—Colorado, Utah, California, Washington, Alberta, British Columbia, Alaska.

Alar expanse.—13–18 mm.

Type.—In American Museum.

Type locality.—San Luis Obispo, Calif.

24. LASPEYRESIA LEUCOBASIS Busck

(Figs. 157, 332)

Laspeyresia leucobasis Busck, Proc. Ent. Soc. Washington, vol. 18, 1916, p. 152.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7248–1, 1917.

Similar to *prosperana* but distinguished by genitalia and the characters given in our key. Hind wing with veins 3 and 4 stalked.

Aedoeagus long, tapering, moderately stout; cornuti a row of a dozen short slender spines.

Genitalia figured from specimens in National Collection from Missoula, Mont. (reared June 1, 1915, under Hopk. U. S. no. 11082, from larvae in bark of *Picea engelmanni*, B. T. Harvey). In nature *leucobasis* feeds and flies in company with both *rana* and *laricana*.

Specimens in National Collection from Montana.

Alar expanse.—12–14 mm.

Type.—In National Collection.

Type locality.—Evaro, Mont.

Food plants.—*Larix occidentalis*, *Picea engelmanni*.

25. LASPEYRESIA GALLAESALICIANA (Riley)

(Figs. 166, 331)

Grapholitha gallaesaliciana Riley, Trans. St. Louis Acad. Sci., vol. 4, 1881, p. 320.

Enarmonia gallaesaliciana Fernald, in Dyar List N. Amer. Lepid., no. 5280, 1903.

Laspeyresia gallaesaliciana Barnes and McDunnough, Check List of Lepid. Bor. Amer., no. 7236, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 395.

The palest of the *Lespeyresia* (except *lautiuscula*), and a very beautiful species. The larvae are gall makers on stems of willow. Hind wing with veins 3 and 4 short stalked. Aedoeagus slender, tapering to a narrow band toward apex; cornuti a single cluster of short rather slender fixed spines.

Genitalia figured from reared specimens in National Collection from Boston, Mass. (May 6–8, 1910, Miss Clarke).

Distribution.—Massachusetts, New Jersey, Pennsylvania, Illinois, Missouri.

Alar expanse.—11–13 mm.

Type.—In National Collection.

Type locality.—St. Louis, Mo.

Food plant.—*Salix*.

26. LASPEYRESIA LAUTIUSCULA, new species

(Fig. 168)

Antenna dusted with white above. Palpus, face, and head white. Thorax black marked with white; posterior part of thorax and almost all the tegula except anterior margin, white. Fore wing white with apical area blackish and an incomplete dark basal patch; basal patch lead colored, rather faint, reaching only to top of cell from dorsum; apical dark area triangular, inner margin straight and slanting, extending from outer third of dorsum to apex; costa very faintly marked beyond middle with outwardly slanting, pale, smoky

dashes extending as far as top of cell; some blue metallic markings just below apex and a couple of similarly colored vertical bars above tornus; cilia dark smoky fuscous with a black basal band. Hind wing smoky fuscous, white toward base; under surface white with some fuscous mottling toward apex; cilia whitish with a dark basal band from apex to vein 1b; veins 3 and 4 stalked.

Female genitalia of type figured; ductus bursae and neck of bursa copulatrix strongly chitinized.

Alar expanse.—15 mm.

Type.—In collection Blackmore.

Type locality.—Fraser Mills, British Columbia.

Described from unique female type (L. E. Marmont, "27–VI–22," Blackmore No. 58). Similar in color and pattern to *gallaesaliciana* Riley and distinguished from that species chiefly by its larger size and the more heavily chitinized ductus and bursa of its genitalia.

27. LASPEYRESIA? FLEXILOQUA, new species

(Fig. 142)

Antenna sordid white above. Palpus, face, head, and thorax whitish gray. Fore wing white with blackish markings; an outwardly angulate black basal patch, much broken by white but with the outer margin complete from costa to dorsum; from middle of costa to cell near upper outer angle, a narrow black band; costa otherwise finely strigulated with black; a black shade filling terminal area from dorsum at outer third to apex, except for a white dusting at tornus; the inner margin of this black area is somewhat irregular and it contains a couple of vertical blue metallic bars above tornus and two similarly colored streaks below apex; on median white area, especially toward dorsum, some fine dusting or streaks of black; cilia leaden fuscous, with a black basal line broken by a small white spot below apex. Hind wing pale smoky fuscous, darkest toward apex; cilia paler with a dark basal band; under surface of hind wing concolorous with cilia; veins 3 and 4 very short stalked.

Female genitalia of type figured.

Alar expanse.—16 mm.

Type.—In Canadian National Collection.

Type locality.—Calgary, Alberta.

Described from female type ("6–VII–21"). A rather striking form, somewhat similar to *lautiuscula* but with different genitalia, complete basal patch and more black dusting on the white areas. The generic reference is tentative. It may be that the species should go in *Hemimene* (the genitalia seems to suggest it): but, in absence of a male, this can not be definitely determined.

28. LASPEYRESIA AMERICANA (Walsingham)

(Figs. 158, 336)

Grapholitha americana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 67.

Enarmonia americana FERNALD, in Dyar List N. Amer. Lepid., no. 5276, 1903; *not* Kearfott, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 362.

Laspeyresia americana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7244, 1917.

A large Pacific coast species superficially resembling *Epiblema infelix* Heinrich. May be readily recognized by its genitalia and the large clear white dorsal spot upon an otherwise dark purplish fuscous fore wing. Hind wing with veins 3 and 4 short stalked. Aedoeagus extremely stout at base and tapering evenly to a very narrow apex; cornuti a longitudinal row of a half a dozen short stout fixed spines.

Genitalia figured from specimens in National Collection from Colfax, Calif. (A. H. Vachell, "V–1").

Distribution.—California, Washington, British Columbia.

Alar expanse.—13.5–19 mm.

Type.—In British Museum.

Type locality.—Mendocino County, Calif.

29. LASPEYRESIA FLAVICOLLIS (Walsingham)

(Fig. 149)

Cydia? flavicollis WALSINGHAM, Proc. Zool. Soc. London, 1897, p. 130.

There is a perfect female of this beautiful species in the Kearfott collection at the American Museum. It is labeled "Everglades, Florida, April 8–15." This is our first North American record.

Hind wing with veins 3 and 4 stalked.

Genitalia figured from specimen in American Museum.

Alar expanse.—15 mm.

Type.—In "Museum Hedemann" (?).

Type locality.—St. Thomas, British West Indies.

30. LASPEYRESIA NINANA (Dyar)

(Figs. 148, 335)

Carpocapsa ninana RILEY, in Smith's List Lep. Bor. Amer. no. 5025, 1891.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 7273, 1917.

Cydia ninana DYAR, List N. Amer. Lepid., no. 5298–1, p. 471.

Although this species is attributed to Riley in the Smith list, the first description is by Dyar and it must therefore be credited to him. Like *flavicollis*, it is probably of tropical origin. Both species may eventually have to have a different generic designation; but at

present we have no characters to justify their separation from *Laspeyresia.*

In this and the following five species there is a slight fold along vein 1^c in the male hind wing. On this character we might put them all in *Carpocapsa;* but such an arrangement is not justified by the genitalia. I am therefore restricting that genus to its type (*pomonella*).

Hind wing with veins 3 and 4 stalked.

Genitalia figured from paratypes in National Collection. Aedoeagus long, slender, curved, tapering; cornuti a few (3–6) slender, minute spines.

Specimens in National Collection and American Museum from the type locality.

Alar expanse.—17–19 mm.

Type.—In National Collection.

Type locality.—Arizona.

31. LASPEYRESIA COLORANA (Kearfott)

(Figs. 167, 337)

Cydia colorana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 93.
Carpocapsa colorana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7277, 1917.

A striking form with unusual genitalia. In pattern it reminds of *Melissopus*, but is considerably paler. Hind wing with veins 3 and 4 stalked.

Aedoeagus stout; cornuti a single cluster of 8 rather short stout fixed spines.

Genitalia figured from type in American Museum (male) and paratype in National Collection (female); latter from Glenwood Springs, Colo. ("June–24–30").

Specimens in National Collection, American Museum, and collection Barnes from Colorado.

Alar expanse.—22–24 mm.

Type.—In American Museum.

Type locality.—Salida, Colo.

32. LASPEYRESIA EROTELLA (Heinrich)

(Figs. 141, 338)

Carpocapsa erotella Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923. p. 121.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 396.

A small easily recognized species. Hind wing with veins 3 and 4 stalked. Aedoeagus stout, slightly tapering; conutus a single thin, moderately long, fixed spine.

Genitalia figured from type (female) and paratype (male) in National Collection.

In addition to the type and paratypes in the National Collection there is a paratype from Biloxi, Miss., in the Cornell University collection; also a female of what I take to be a possible western variety from Patrick's Creek, Calif. (reared Sept. 14, 1916, under Hopk. U. S. No. 14289[d] from *Pinus atenuata*, J. E. Patterson). This last is in the National Collection. In pattern and genitalia it agrees with typical *erotella* except that the ocelloid patch of fore wing is more heavily streaked with black. I doubt if it will prove sufficiently distinct to deserve a varietal name.

Alar expanse.—9–10 mm.

Type.—In National Collection.

Type locality.—Hyattsville, Md.

Food plant.—*Pinus taeda.*

33. LASPEYRESIA TOREUTA (Grote)

(Fig. 159)

Penthina toreuta Grote, Bull. Buffalo Soc. Nat. Sci., vol. 1, 1873, p. 92.

Cydia toreuta Fernald, in Dyar List N. Amer. Lepid., no. 5298, 1903.

Carpocapsa toreuta Kearfott, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 362.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7272, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 396.

A moderately sized species quite different in pattern and color from everything in the genus except *ingens* and *piperana*. From these two it is readily separable on genitalia (particularly those of the female) and distribution. The true *toreuta* is limited to the eastern United States above Florida. It is somewhat smaller than *piperana* and *ingens* and has smaller male genitalia and proportionately smaller aedoeagus; the neck of the harpe is more incurvate than that of *piperana* and not so long as that of *ingens*. Hind wing with veins 3 and 4 connate or very short stalked.

Female genitalia figured from specimen in National Collection from Falls Church, Virginia (reared Aug. 13, 1919 under Hopk. U. S. No. 12033[c] from larva feeding in cones of *P. virginiana*, Wm. Middleton).

Distribution.—Texas, North Carolina, Virginia, District of Columbia, Pennsylvania.

Alar expanse.—13–15 mm.

Type.—In National Collection.

Type locality.—Pennsylvania.

Food plant.—*Pinus virginiana* (larvae feeding in the cones).

34. LASPEYRESIA INGENS, new species

(Fig. 161)

Similar to *toreuta* and *piperana* but with different genitalia and distribution; larger than the former.

Palpus sordid whitish; apical joint fuscous beneath. Head sordid white shaded with fuscous. Fore wing ashy brown, under magnification showing the scales beyond base dark brown tipped with sordid white; basal area glossy; from costa just before middle to mid dorsum a narrow, slightly angulate metallic bar edged inwardly and outwardly with black; a similar, somewhat more angulate bar from costa beyond middle to tornus, broken between veins 6 and 8; another similar bar extending along termen to just below apex, thence curving upward and inward to a white costal spot near apex; between this and the preceeding bar two obscure white costal marks terminating in metallic droplets; extreme terminal margin black; cilia leaden fuscous. Hind wing smoky fuscous; cilia paler with a dark basal band; veins 3 and 4 short stalked.

Female genitalia of type figured. Male genitalia as in *piperana;* but neck of harpe considerably more (nearly twice as much) extended and with an irregular rounded projection from the arch; cucullus more irregular in outline, slightly concave on lower margin and below apex; adeoeagus a third longer.

Alar expanse.—17–20 mm.

Type.—In collection Barnes.

Paratype.—Cat. No. 28022, U.S.N.M. Also in American Museum and collection Barnes.

Type locality.—St. Petersburg, Fla.

Described from female type, one male and two female paratypes all from the type locality.

35. LASPEYRESIA PIPERANA (Kearfott)

(Figs. 163, 333)

Cydia piperana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 55.
Carpocapsa piperana Barnes and McDunnough, Check List Lepid. Bor. Amer., no 7274, 1917.

Very similar to *toreuta* Grote; but with different genitalia and limited to the western (Rocky Mountain and Pacific Coast) States, where it is a species of considerable economic importance. The larvae feed in pine cones. The favorite food plant seems to be *P. ponderosa.* The species has the same life cycle and feeds and flies with *Hedulia injectiva,* with which it also seems to hybridize (see p. 66).

Genitalia figured from specimens in American Museum (male type) and National Collection (female paratype from the type locality (C. V. Piper, "11 Mch.–78")).

Distribution.—Idaho, Montana, Washington, Oregon, California. Represented by large reared series in the National Museum.

Alar expanse.—16–20 mm.

Type.—In American Museum.

Type locality.—Pullman, Wash.

Food plant.—Pinus ponderosa, P. jeffreyi.

36. LASPEYRESIA MISCITATA, new species

(Fig. 160)

An intermediate between *L. piperana* Kearfott and *Hedulia injectiva* and partaking of the characters of both species. It lacks entirely the hairy vestiture of the latter. Both otherwise resembles it very closely; having blackish palpi and similarly colored hind wings. The head is black as in *injectiva* but with a pepering of white at the scale ends. The fore wing is glossy at base as in *piperana;* but generally darker (in most specimens) and colored more as in *injectiva;* at tornus on inner margin of the terminal metallic bar there is more black scaling than in either of the other two species, this is sometimes extended into irregular streaks and gives the appearance of an ocelloid patch.

Genitalia as in *injectiva.* In the female the genital plate varies somewhat in size and shape in different specimens; in some it is quite like that of *injectiva*, in others narrower and smaller; the extreme form is shown in figure 160 (paratype from the type locality).

Alar expanse.—11.5–17 mm.

Type.—Cat. No. 28023, U.S.N.M.

Paratypes.—In National Collection, American Museum, Canadian National and Barnes collections.

Type locality.—Shasta National Forest, Calif.

Food plants.—Pinus ponderosa, P. jeffreyi.

Described from male type and 4 female paratypes from the type locality (reared under Hopk. U. S. No. 11414, May, 1912, from larvae feeding in cones of *P. jeffreyi*, J. M. Miller); 2 male and 2 female paratypes from Ashland, Oreg. (reared May 11, June 24, and Aug. 26, 1914, under Hopk. U. S. Nos. 10876 and 12539 *h*, from *P. ponderosa*, P. D. Sargent); 2 male and 1 female paratypes from Felton, Calif. (reared Dec. 30, 1916 under Hopk. U. S. No. 11312*a* from *P. ponderosa*, P. D. Sargent); one female paratype from Bray, Calif. (reared September 18, 1915, under Hopk. U. S. No. 14298*a* from *P. ponderosa*, J. D. Riggs); and one female paratype from Verdi, Nev. ("June 1–10," A. H. Vachell); this last had been included

by Kearfott as one of the paratypes of his manuscript species, "*Enarmonia bandana*" (see remarks under *Grapholitha caeruleana*, p. 31). The above-reared specimens selected from a large series from cones also infested with either *L. piperana* or *H. injectiva*.

I dislike very much to name this form, as I am strongly of the opinion that it represents a hybrid of *piperana* and *injectiva;* but as this has not as yet been demonstrated by rearings from known parents, there is nothing else to do.

12. HEDULIA, new genus

(Figs. 162, 334)

Genotype.—Hedulia injectiva, new species.

Characters as in *Grapholitha* except:

Head, palpi, legs, and underside of thorax and abdomen covered with fine rather long hair.

Fore wing with some fine hair-like scales toward base; termen convex.

Hind wing with veins 3 and 4 stalked; inner margin hairy.

Abdomen of male simple.

A derivative of the *toreuta* group of *Laspeyresia*. The hairy vestiture is unique in the family and reminds of *Symnona* in the Tortricidae. Contains only the one North American species.

HEDULIA INJECTIVA, new species

(Figs. 162, 334)

Similar in pattern to *Laspeyresia piperana*, but darker, with white hind wing cilia and bicolored hind wings. Distinguished at once by the hairy vestiture.

Antenna, palpus, face, head, and thorax black; inner side of palpus sordid whitish ocherous. Fore wing blackish fuscous, the ends of the scales tipped with sordid ocherous, giving a dark wood brown color to the naked eye; basal area not appreciably glossy; a somewhat irregular and rather obscure metallic band from costa before middle to mid dorsum and widening out a trifle toward dorsum; a similar, but more regular and angulate band from costa beyond middle to tornus, in some specimens broken near middle; another similar bar (or band) along termen to below apex; extreme costal margin whitish ocherous, this pale scaling produced beyond middle into from 4 to 6 geminate marks, from the apical one of which a leaden band continues toward termen terminating close to upper end of terminal metallic bar; extreme terminal margin black; cilia leaden fuscous. Hind wing smoky blackish fuscous, shading to sordid whitish toward base; cilia white with a dark basal band. Under side of fore wing with a slight dusting of white near termen, and

with pale costal markings somewhat more distinct than on upper surface; underside of hind wing blackish, dusted with whitish on disk and toward apex. Abdomen black above. Hairy vestiture of abdomen and legs mixed black and grayish ocherous.

Genitalia figured from type and paratype from the type locality.

Alar expanse.—16–20 mm.

Type and paratypes.—Cat. No. 28024, U.S.N.M. Paratypes also in American Museum, Canadian National, and Barnes collections.

Type locality.—Reno, Nev.

Food plant.—Pinus.

Described from male type; 4 male and 1 female paratypes from the type locality (labeled: "In pine cones, issued 1–24–11, J. B. Smith"); 1 male and 2 female paratypes from Ureka, Calif. (reared under Hopk. U. S. No. 11413 and 10889*a*, February 10–16, 1912, and March 2, 1914, from larvae in cones of *Pinus jeffreyi*, J. M. Miller); 2 male paratypes from Pine Valley, Calif. (reared under Hopk. U. S. No. 13276, August 27, 1915, from cones of *P. jeffreyi*, F. P. Keen); 1 female paratype from Mona National Forest, Calif. (Hopk. U. S. No. 12557a^2, issued February 22, 1915, from cones of *P. jeffreyi*); and 1 male paratype from Ashland, Oreg. (Hopk. U. S. No. 12539 *h*, issued August 26, 1914, from cones of *P. ponderosa*, P. D. Sergent). These are from a large series reared by the Forest Insect Division of the Bureau of Entomology. In addition to the above, we have reared specimens from several other California localities and two examples (a male and female) labeled "From pine cones, North Carolina."

This species occurs in the same localities and has the same life history and habits as *piperana* Kearfott, and seems to be even more abundant and destructive than the latter. Its larvae feed in pine cones. The favorite food plant appears to be *P. jeffreyi*, though cones of *P. ponderosa* and other pines are occasionally attacked. It seems to hybridize with *L. piperana* (see p. 65).

13. Genus MELISSOPUS Riley

(Figs. 2, 9, 36, 113)

Melissopus Riley, Trans. St. Louis Acad. Sci., vol. 4, 1881, p. 322.
Genotype.—Carpocapsa latiferreana Walsingham (North America).

Thorax smooth.

Fore wing smooth; termen slightly concave; 12 veins all separate; 7 to termen; 11 from cell just before middle; 10 remote from 9; upper internal vein of cell from between 10–11; 3, 4, and 5 somewhat approximate at termen; 2 from cell before ⅔, straight; no costal fold in male.

Hind wing with pecten from lower median vein, in male this is developed as a narrow, long hair pencil concealed in a deep, semi-elliptical, closely appressed pocket lying along basal half of vein 2; 8 veins; 6 and 7 approximate toward base; 3 and 4 stalked; 2 from cell before middle in male, normal in female; inner margin (in male) developed into a shallow pocket filled with broadly spatulate white scales above, and rough scaling beneath.

Hind tibia and basal joint of hind tarsi of male dilated and clothed with dense, latterally appressed scale tufts above and below.

Male genitalia with harpe simple; outer surface unspined; cucullus well defined, evenly and heavily spined; neck incurvation slight; neck smooth except at base of cucullus; sacculus simple, rather densely clothed with fine, short, hairlike spines. Tegmen elongate; inner posterior margins scobinate; posterior lateral extremities sometimes produced into hornlike projections resembling a widely bifurcate uncus. Uncus absent. Socii absent. Gnathos scarcely defined, very weakly chitinized. Aedoeagus straight, tapering sharply before middle and continued as a very slender tube; simple or with a lateral spur from near middle; cornuti absent.

Abdomen of male simple.

Female genitalia with two thornlike signa. Ductus bursae short, unchitinized. Bursa copulatrix with neck evenly and strongly granulate.

A monotypic genus derived from the *toreuta* group of *Laspeyresia*.

MELISSOPUS LATIFERREANUS (Walsingham)

(Figs. 2, 9, 31, 32, 33, 34, 35, 36, 112, 113)

Carpocapsa latiferreana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 70.

Melissopus aurichalccana Riley, Trans. St. Louis Acad. Sci., vol. 4, 1881, p. 323.

Melissopus latiferreanus Fernald, in Dyar List N. Amer. Lepid., no. 5295, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7269, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 397.

Cydia inquilina Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 55.

Carpocapsa inquilina Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7276, 1917.

An extremely variable species in color, size, and structure, and one which seems to be in the process of breaking up into several races or even species. In extreme forms (A and G) the male genitalia differences are very striking, but they do not correspond with either size or color differences and in large series from different localities there are so many intergrades that division into clearly definable races is impossible. I list below the forms that I have seen.

Further material will undoubtedly show others. It is possible that we had originally two species, an Eastern (var. G) and a Western (var. A) which have interbred to produce the intermediate forms; but this is a mere guess. Careful and extensive rearings from known parents will be necessary before we can determine the exact status of any of the varieties. Until we have such, it would be very unwise to make any new names or attempt any splitting of the species.

Var. A (fig. 36).—Tegumen of male genitalia without posterior projecting horns; aedoeagus with a long lateral spur reaching from below middle almost to apex; apex of spur bent over, broadened and serrate. Color ranging from pale reddish brown to rosy gray brown. Expanse: 13–20 mm. Distribution: California, Oregon, and Washington. Reared specimens from acorns.

This is the typical *latiferreanus*. Kearfott's *inquilina* also goes here.

Var. B (fig. 32).—Tegumen without posterior horns; aedoeagus with rather long spur, latter, however, not reaching to apex of aedoeagus, smooth and pointed. Color as in variety *A*, but most specimens rather pale. Expanse: 18–20 mm. Distribution: Utah. None of specimens in collections reared.

Var. C (fig. 33).—Tegumen developed posteriorly into two stout, well separated, rather long, slightly roughened, partially curved hornlike projections; aedoeagus simple. Color as in varieties *A* and *B*. Expanse: 13–20 mm. Distribution: California, Arizona, New Mexico. Reared specimens from acorns.

Var. D (fig. 34).—Tegumen developed posteriorly into two very short hornlike projections; aedoeagus with very short, pointed, lateral spur. Color, very dark red-brown; hind wing dark brown with strongly contrasted white cilia; a rather strong black dusting on forewing between the metallic cross bars. Expanse: 15–20 mm. Distribution: Pennsylvania, Virginia, Connecticut. The only reared specimens are a couple in the National Collection (Hopk. U. S. No. 12106 Falls Church, Va., July 10 and 25, 1914, Heinrich) bred from chestnut husks.

The most distinct form so far as color is concerned. There is a pale Nevada form, however, with similar genitalia.

Var. E.—Tegumen as in variety *A;* aedoeagus as in variety *B*. Color, reddish brown. Expanse: 11–13 mm. Distribution: West Virginia, Pennsylvania, Illinois. Reared specimens from beech nuts (Quaintance No. 7590, French Creek, West Virginia, F. E. Brooks). Collected adults from Pennsylvania and Illinois intergrade between this and the following variety and are difficult to place.

Var. F (fig. 35).—Genitalia as in variety *E* except that posterior projections of tegumen are straight and longer. Color yellow or

yellowish red. Expanse: 16–17 mm. Distribution: Missouri, Texas, North Carolina, Pennsylvania. Reared specimens from acorns.

Riley's type of *aurichalceana* goes here.

Var. G (fig. 31).—Tegumen with long, straight, roughened, hornlike posterior projections; aedoeagus simple. Color reddish brown or reddish ocherous. Expanse: 15–17 mm. Distribution: Pennsylvania, Missouri, Florida, Mexico. Reared specimens from acorns.

In all these forms the female genitalia also show some slight variations. Varieties *A* (fig. 113), and *E* (fig. 112) exhibit the extreme differences. Between these there is a gradual intergradation in the other varieties.

Alar expanse.—11–20 mm.

Types.—In British Museum (*latiferreanus*); National Collection (*aurichalceana*); American Museum (*inquilina*).

Type localities.—Medocino County, Calif. (*latiferreanus*); Kirkwood, Mo. (*aurichalceana*); San Francisco, Calif. (*inquilina*).

Food plants.—Oak acorns, beech nuts, chestnut burs.

14. Genus CARPOCAPSA Treitschke

(Figs. 37, 169)

Carpocapsa Treitschke, Schmet. Eur., vol. 8, 1830, p. 160 (=*Cydia* Walsingham not Hübner).

Genotype.—Phalaena Tinea pomonella Linnaeus (Europe).

Thorax smooth.

Fore wing smooth; termen straight; 12 veins, all separate; 7 to termen; 11 from cell slightly beyond middle; 9 and 10 well separated; upper internal vein of cell from between 10–11; 3, 4, and 5 nearly parallel beyond cell, not approximate at termen; 2 from cell before ⅔, straight; no costal fold in male.

Hind wing with pecten from lower median vein, in male developed as a long slender black hair pencile inclosed in a shallow pocket along vein 1*c*; 8 veins; 6 and 7 approximate toward base, 3 and 4 stalked; 2 form cell at outer ⅘ in male; inner margin in male simple.

Hind tibia of male smooth scaled.

Male genitalia with outer surface of harpe unspined; cucullus well defined, finely and evenly spined; neck incurvation slight; a short, thornlike projection from neck near cucullus (a similar development is also found in a few species of *Laspeyresia*), otherwise smooth; sacullus weakly spined. Tegumen a rather narrow chitinized band. Uncus absent. Socii absent. Gnathos a simple weakly chitinized band. Aedoeagus moderately long, stout, slightly tapering; cornuti a cluster of short, stout fixed spines (6–8).

Abdomen of male simple.

Female genitalia with two thorn-like signa. Ductus bursae short, strongly chitinized and scobinate.

As it is now defined this is not a good genus. The only two distinguishing characters (the thorn-like projections from harpe near cucullus and the fold inclosing the pecten in hind wing of male) are shared in greater or less degree by some species of *Laspeyresia* which on genitalia and habitus go better with other and more normal *Laspeyresia* species than they do with *pomonella*. Indeed the hind wing fold is not a good character at all for in the *toreuta* group of *Laspeyresia* it disappears so gradually as to leave one often in doubt whether it is or is not present. I am convinced, however, that some day when we know more of the larvae, *Laspeyresia* will be further divided and that *Carpocapsa* will then apply legitimately to one of the divisions. In the meantime nothing is gained by suppressing a widely used name that eventually will be restored. I am therefore keeping *Carpocapsa* and restricting the genus to the type. None of the other species now included goes as well with *pomonella* as with some typical *Laspeyresia*. The two in our North American lists (*saltitans* Westwood and *sabastianniae* Riley) I omit altogether from this paper. They are Mexican insects, of whose occurrence in the United States we have no authentic records.

KEY TO THE SPECIES OF CARPOCAPSA

1. General color of fore wing and thorax, grayish fuscous; hind wing smoky fuscous ..... (1) **pomonella.**
   General color of fore wing and thorax, golden ocherous; hind wing pale ocherous ..... (2) variety **simpsoni.**

1. CARPOCAPSA POMONELLA (Linnaeus)

(Figs. 37, 169, 329)

Phalaena Tinea pomonella Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 538.

Carpocapsa pomonana Treitschke, Schmet. Eur., vol. 8, 1830, p. 161.

Carpocapsa pomonella Harris, Inj. Ins., 1862, p. 484.—Staudinger and Rebel, Cat. Lepid., vol. 2, no. 2257, 1901.—Busck, Proc. Ent. Soc. Washington, vol. 5, 1903, p. 235.—Simpson, Ent. Bull. U. S. Dept. Agr., no. 41, 1903.—Foster, Ent. Bull. U. S. Dept. Agr., no. 80, pt. 5, 1910; Ent. Bull. U. S. Dept. Agr., no. 97, 1911.—Hammer, Ent. Bull. U. S. Dept. Agr., no. 115, pt. 1, 1912.—Quaintance and Geyer, Ent. Bull. U. S. Dept. Agr., no. 429, 1917.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7270, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Expt. Sta., 1924, p. 396.

Cydia pomonella Walsingham, Proc. Zool. Soc. London, 1897, p. 130; Biol. Cent. Amer. Lepid. Heter., vol. 4, 1914, p. 259.—Fernald, in Dyar List, N. Amer. Lepid., no 5296, 1903.—Pierce and Metcalfe, Genitalia Brit. Tort., 1921, p. 82.

The notorious codling moth has a very extensive literature. Simpson's bulletin, cited above, gives a bibliography to 1903 and the Biologia all the systematic references to 1914. Only a few of the more important references are given here. Detailed accounts of the life history will be found in the Government bulletins.

Genitalia figured from specimens in National Collection from Hyattsville Md. (male), and unknown locality (female).

Distribution.—The species has a wide distribution, corresponding practically to the range of the cultivated apple. The following are only the North American records from specimens in the four collections studied: New Hampshire, New York, New Jersey, Pennsylvania, Maryland, Virginia, Georgia, Ohio, Iowa, Missouri, Arkansas, Utah, California, Washington, British Columbia, Ontario, Quebec.

Alar expanse.—15–22 mm.

Type.—Location unknown.

Type locality.—Europe.

Food plants.—Apple, pear, walnut, quince.

2. CARPOCAPSA POMONELLA SIMPSONI (Busck)

Cydia pomonella simpsoni Busck, Proc. Ent. Soc. Washington, vol. 5, 1903, p. 235.

Carpocapsa pomonella simpsoni Barnes and McDunnough, Check List Lepid. Bor. Amer., no 7270*a*, 1917.

A rare and striking color variety. It is not in any strict sense a race and shows no structural differences from typical *pomonella;* but the varietal designation is convenient and should be retained, particularly as there are no intermediate, intergrading color forms.

Distribution.—New Mexico, Colorado, Idaho, California.

Alar expanse.—16–18 mm.

Type.—In National Collection.

Type locality.—Boise, Idaho.

Food plant.—Apple.

15. Genus GYMNANDROSOMA Dyar

(Figs. 1, 3, 5, 38, 121)

Gymnandrosoma Dyar, Proc. Ent. Soc. Washington, vol. 6, 1904, p. 60.

Genotype.—Gymnandrosoma punctidiscanum Dyar (North America).

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins, all separate; 7 to termen; 11 from cell at middle; 10 remote from 9: upper internal vein of cell from between 9 and 10; 3, 4, and 5 remote at termen; 2 from cell just beyond middle, straight; no costal fold in male.

Hind wing with normal pecten from lower median vein; 8 veins; 6 and 7 approximate toward base; 5 parallel with 4 or (in *desotanum*) bent at base; 3 and 4 connate; inner margin in male roughly scaled above and excavated below into a broad shallow pocket.

Hind tibia of male dilated, heavily rough sealed and with a heavy dorsal hair pencile from base above.

Male genitalia as in *Ecdytolopha* except: spining of cucullus encroaching on neck of harpe; sacculus more weakly spined than neck.

Abdomen of male with a pair of dorso-lateral yellow hair penciles from caudal edge of second segment.

Female genitalia with two strong thornlike signa. Ductus bursae rather short; weakly chitinized at genital opening. Bursa copulatrix with one or two strong chitinized patches on neck.

Closely related to *Ecdytolopha*.

KEY TO THE SPECIES OF GYMNANDROSOMA

1. Pale areas on outer third of fore wing, sordid whitish; hind wing with vein 5 straight ..... (1) **punctidiscanum.**
   Pale areas on outer third of fore wing brownish ocherous; hind wing with vein 5 bent at base ..... (2) **desotanum.**

1. GYMNANDROSOMA PUNCTIDISCANUM Dyar

(Figs. 1, 3, 5, 38, 121, 341)

Gymnandrosoma punctidiscanum Dyar, Proc. Ent. Soc. Washington, vol. 6, 1904, p. 60.—Kearfott, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 362.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7252, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 397.

Resembles *Ecdytolopha insiticiana*, differing chiefly in the secondary sexual characters of the male and in having a strong white dot on fore wing at end of cell.

Genitalia figured from specimens in National Collection from Quincy, Ill. (Poling, male) and Washington, D. C. (Busck, "Aug. 1903," female).

Distribution.—Massachusetts, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, North Carolina, South Carolina, Florida, Texas, Missouri, Illinois, Indiana.

Alar expanse.—16.5–25 mm.

Type.—In National Collection.

Type locality.—Washington, D. C.

2. GYMNANDROSOMA DESOTANUM, new species

(Fig. 123)

Antenna blackish fuscous; basal joint black. Palpus extending a trifle more than the length of the head beyond it; blackish fuscous slightly dusted with ocherous; upper edge sordid whitish. Face,

head, and thorax blackish fuscous with a faint sprinkling of dark, sordid ocherous scales. Fore wing with basal two-thirds blackish fuscous; outer margin of this dark patch angulate, extending from costa beyond middle outwardly to lower outer angle of cell and thence inward to mid dorsum; a small round white discal dot at upper outer angle of cell; a dark angulate subtornal spot with apex touching the apex of the dark basal patch; area between lower outer margin of basal dark patch and subtornal spot, sordid brownish ocherous, distinguishable as a broad geminate dash; apical area sordid brownish ocherous with an irregular, blackish fuscous inwardly curved, subapical band extending from apex to tornus; costa faintly strigulated with blackish and brownish ocherous; in some specimens an obscure pale blotch on costa before middle; cilia dark fuscous with some sprinkling of dull ocherous. Hind wing dark smoky fuscous; cilia but slightly paler with an obscure dark basal band.

Female genitalia of type figured.

Alar expanse.—21–22 mm.

Type.—In American Museum.

Paratype.—Cat. No. 28025, U.S.N.M.; also in collection Barnes.

Type locality.—Everglades, Fla.

Described from female type and four female paratypes from the type locality, without collector label and dated "Apr. 19–1912" and "April 8–15." These had been set aside by Kearfott as a new species.

I have not seen the male and am therefore unable to place the species with absolute certainty; particularly as vein 5 of hind wing is bent at base as in the Olethreutinae. This, however, is probably only a specific aberration. In wing pattern and female genitalia it is quite similar to *punctidiscanum.*

16. Genus ECDYTOLOPHA Zeller

(Figs. 10, 115)

Ecdytolopha Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 266.
Genotype.—Ecdytolopha insiticiana Zeller (North America).

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins, all separate; 7 to termen; 11 from cell at middle; 10 remote from 9; upper internal vein of cell from between 9 and 10; 3, 4, and 5 remote at termen; 2 from cell before ⅔ (near middle), straight; no costal fold in male.

Hind wing with normal pecten on lower median vein; 8 veins; 6 and 7 approximate toward base; 3 and 4 connate or very short stalked; in male an appressed pocket containing a strong yellow hair pencile at base of vein 1*a*.

Hind tibia of male loose scaled but not appreciably dilated or tufted.

Male genitalia with outer surface of harpe unspined; cucullus large, spoon-shaped, finely and evenly spined; neck incurvation slight; neck and sacculus evenly and finely clothed with hair-like spines. Uncas absent. Socii absent. Gnathos a weakly chitinized band. Aedoeagus long, slender, slightly curved and scarcely tapering; cornuti a small cluster of moderately long, slender, deciduous spines.

Abdomen of male simple.

Female genitalia with two thorn-like signa. Ductus bursae rather long, unchitinized except at genital opening. Bursa copulatrix large, finely granulate at neck.

A small North American genus closely related to *Gymnandrosoma* and with affinities to the *Endothenia* group of the Olethrentinae. The genitalia are typically Laspeyresiin; but otherwise the genus would go better with *Endothenia* than with *Laspeyresia*. Probably a primitive form and (with *Gymnandrosoma*) linking the Laspeyresiinae and Olethreutinae.

KEY TO THE SPECIES OF ECDYTOLOPHA

1. Fore wing with subapical bar distinct ..... (1) **insiticiana**
   Fore wing with subapical bar nearly obsolete (very faintly indicated) ... 2.
2. Fore wing with subtornal spot on dorsum, distinct ..... (2) **mana.**
   Fore wing with subtornal spot obsolete or very faint ..... (3) **islandana.**

1. ECDYTOLOPHA INSITICIANA Zeller

(Figs. 10, 115, 340)

Ecdytolopha insiticiana Zeller, Verh. Zool.-bot. Ges. Wien., vol. 25, 1875, p. 266.—Packard, Fifth Report U. S. Ent. Com., 1890, p. 359.—Fernald, in Dyar List N. Amer. Lepid., no. 5287, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7253, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 397.

An insect of considerable economic importance. The larva is a stem borer in *Robinia*. It attacks only new growth and forms a large elongate gall which cracks open with age and disfigures the tree. In the vicinity of Washington there are two generations a year; the species overwintering as larvae under the debris on the surface of the ground in flattened bean-shaped cocoons made of pieces of fallen leaves, evenly cut, sewed together, and lined with silk. Pupation takes place in April, and moths from overwintering cocoons issue from early May until the end of June. These lay eggs which hatch in from 5 to 6 days; the larvae feeding up, pupating and again producing moths from early July to early September. The larvae feed up in about 20 days during summer; but in the fall take considerably longer, and those that hatch last from the eggs often die before they have completed their growth. The entire life

cycle from adult to adult is completed in a little over a month (35 to 40 days) in early and middle summer. Larvae are to be found, therefore, in nearly all stages from late May to early November (our last field date for the vicinity of Washington is November 10).

A few specimens have been reared by W. G. Boyd at Weir, Miss. ("7–14–1923") from larvae boring in stems of *Wisteria*. As this is an introduced plant, the infestation was probably accidental or is evidence of a new, acquired habit. I know of no records other than this upon any host but *Robinia*.

Genitalia figured from reared specimens in National Collection from Falls Church, Virginia ("Hopk. U. S. No. 12103 *l*, issued 31 July 1914," male; and "Hopk. U. S. No. 12103 *n*, issued 26 June 1916," female).

Distribution.—New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, Florida, Mississippi, Ohio, New Mexico, Colorado, Arizona, California, Ontario, Manitoba.

Alar expanse.—17–26 mm.

Type.—In British Museum.

Type locality.—Massachusetts.

Food plants.—*Roninia*, *Wisteria*.

2. ECDYTOLOPHA MANA (Kearfott)

(Fig. 117)

Olethreutes mana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 14.—Barnes and McDunnough, Check List. Lepid. Bor. Amer., No. 6822, 1917.

Olethreutes thaliastis Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Represented only by the female type in New York and a female paratype in the Barnes Collection. Hardly to be distinguished from *insiticiana* (of which it may be only an aberration) except by the genitalia. The differences in structure are shown in figures 115, 117.

Genitalia figured from type.

Alar expanse.—18 mm.

Type.—In American Museum.

Type locality.—Black Jack Springs, Tex.

3. ECDYTOLOPHA ISLANDANA (Kearfott)

(Fig. 339)

Olethreutes islandana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 80.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6876, 1917.

Olethreutes insulicola Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 35.

Ecdytolopha islandana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 398.

Known only from the male type. Kearfott described from two specimens, but I am unable to locate the one that is supposed to be in the National Museum. The type is in very poor condition, much rubbed, mouldy, and lacking a head. It looks like a runted specimen of *insiticiana*. The genitalia are similar except for size, being considerably smaller. The name had better be kept until other specimens can be obtained.

Male genitalia figured from type.

Alar expanse.—14 mm.

Type.—In American Museum.

Type locality.—Plummer Island, Md.

Subfamily OLETHREUTINAE

KEY TO THE GENERA OF OLETHREUTINAE

1. Hind wing with veins 3–4 separate (or approximate)---------- 2.
   Hind wing with 3–4 connate (rarely stalked)---------- 4.
2. Hind wing with 3, 4, and 5 well separated at base; 6 and 7 approximate or slightly anastomosing beyond cell; thorax with posterior tuft---------- 3.
   Hind wing with 3, 4, and 5 equidistant but closely approximate at base; 6 and 7 stalked; thorax smooth---------- (2) **Bactra.**
3. Gnathos heavily chitinized and solidly fused with anellus---- (4) **Ahmosia.**
   Gnathos normal---------- (3) **Polychrosis.**
4. Fore wing with termen concave, and veins 3, 4, and 5 approximate at termen; thorax smooth above---------- (1) **Episimus.**
   Fore wing with termen convex or straight and veins 3, 4, and 5 not approximate at termen; thorax with posterior tuft---------- 5.
5. Hind wing with 6–7 stalked---------- 6.
   Hind wing with 6–7 anastomosing beyond cell---------- (7) **Tia.**
   Hind wing with 6–7 approximate toward base---------- 8
6. Socii smooth, rigid---------- (8) **Hulda.**
   Socii hairy, flexible---------- 7.
7. Uncus reduced, weak, bifid---------- (6) **Taniva.**
   Uncus long, strong, spatulate---------- (5) **Endothenia.**
8. Fore wing with upper internal vein of cell from between veins 9–10. (11) **Zomaria.**
   Fore wing with upper internal vein of cell from between veins 10–11--- 9.
9. Fore wing with vein 2 from cell beyond ¾---------- (19) **Evora.**
   Fore wing with vein 2 from cell before ¾---------- 10.
10. Hind tibia of male with hair pencile from base---------- 13.
    Hind tibia of male without hair pencile from base---------- 11.
11. Gnathos produced into a strongly chitinized projecting tongue---- (9) **Esia.**
    Gnathos normal---------- 12.
12. Uncus strongly spined beneath; socii nearly obsolete------- (13) **Sciaphila.**
    Uncus unspined beneath (much reduced); socii well developed. (10) **Eumarozia.**
13. Gnathos strongly scobinate---------- (14) **Badebecia.**
    Gnathos smooth---------- 14.
14. Subanal plate of gnathos strongly chitinized; semitubular--- (12) **Aphania.**
    Subanal plate of gnathos weakly chitinized, flat---------- 15.

		Uncus			
	Absent	Inwardly margined at tip with strong spines	With tip weakly spined	With tip heavy and broadly spatulate	Greatly reduced or absent
			×		
	×	×	×		
	×		×	×	
			×		
	×		×		
			×		
	×	×	×		
			×		
			×		
		×	×		
		×			

COMPARATIVE TABLE OF STRUCTURAL CHARACATERS: OLETHREUTINAE

Column headings (character columns of the table):

Wings — Thorax: With posterior tuft; Without posterior tuft. — **Fore wing**: Upper internal vein from 10–11; Upper internal vein from 8–10; Vein 9 approximate to 8; Vein 9 well separated from 8; Veins 7–8 approximate at termen; Veins 3–4 not approximate at termen; Vein from cell beyond ⅔; Vein 2 from cell at or beyond ⅔ but before ¾; Vein 2 from cell before ⅔; Termen convex or straight; Termen concave. — **Hind wing**: Veins 6–7 approximate toward base; Veins 6–7 stalked (or anastomosing beyond cell); Veins 3–4 separate; Veins 3–4 connate; Veins 3–5 well separated (equidistant); Veins 3, 4–5 ... ly approximate (equidistant); Vein 5 remote from 4; Inner margin with lobe (in male); Inner margin thickened only (in male); Inner margin simple (in male); With secondary hair tuftings (in male).

Legs — Hind tibia of male swollen (tufted); Hind tibia of male with hair pencil from base; Hind tibia of male without hair pencils.

Male genitalia — **Harpe**: With spine cluster (Spc¹) prominent; With spine cluster (Spc¹) fused with spining of cucullus; With spine cluster (Spc²) a group of short stout spines; With spine cluster (Spc²) a tuft of slender hair-like spines; With spine cluster (Spc²) upon a projecting digitus; With spine cluster (Spc²) a few weak hairs or not distinguishable; With a row of flat thin spines from outer surface; Spines on base of cucullus long and strong; Spines on base of cucullus short and weak; Produced into chitinized blade (or tongue). — **Gnathos**: Scobinate; With subanal plate tubular; Normal (a simple band with subanal plate more or less chitinized); Greatly reduced or absent. — **Socii**: Hairy and flexible; Smooth and rigid; Absent. — **Uncus**: Inwardly margined at tip with strong spines; With tip weakly spined; With tip heavy and broadly spatulate; Greatly reduced or absent. — **Penis**: With multiple cornuti; With single cornutus; Without cornuti.

Female genitalia — **Bursa**: With single signum; With two signa; Signum (or signa) disk or pocket like; Signum (or signa) thorn like; Without signum. — **Ductus bursae**: Unchitinized except at attachment to genital opening; Chitinized for all length or at middle or at juncture of bursa; Looped; Very short.

Genus	Remarks
Episimus	¹ Stalked in *lyrias*.
Bactra	¹ Except in two European species. ² Weak.
Polychrosis	¹ Rarely. ² Fused with Spc¹ in type, divided in *viteana*. ³ In *viteana*. ⁴ Often.
Ukamenia	¹ Gnathos peculiarly modified.
Endothenia	¹ In some species not chitinized, in others with arms connecting with socius. ² Fused into tegumen, indicated by hair tufts, semirigid.
Taniva	
Tia	¹ Spc¹ and Spc² probably fused (or Spc¹ absent). ² Very heavily haired.
Hulda	
Exis	¹ Fusing with outer surface spines.
Eumarozia	¹ Except for one large spine from near base of cucullus. ² Upon a slight digitus. ³ Signa as thorn-like disks.
Zomaria	¹ Upon a slight digitus. ² Modified.
Aphania	
Sciaphila	¹ Present, but greatly reduced.
Badebecia	
Phaecasiophora	
Exartema	¹ Normally, rarely with one, two, or three small cornuti. ² Often.
Hedia	¹ Rarely. ² In *lineana* only.
Olethreutes	¹ Rarely.
Evora	

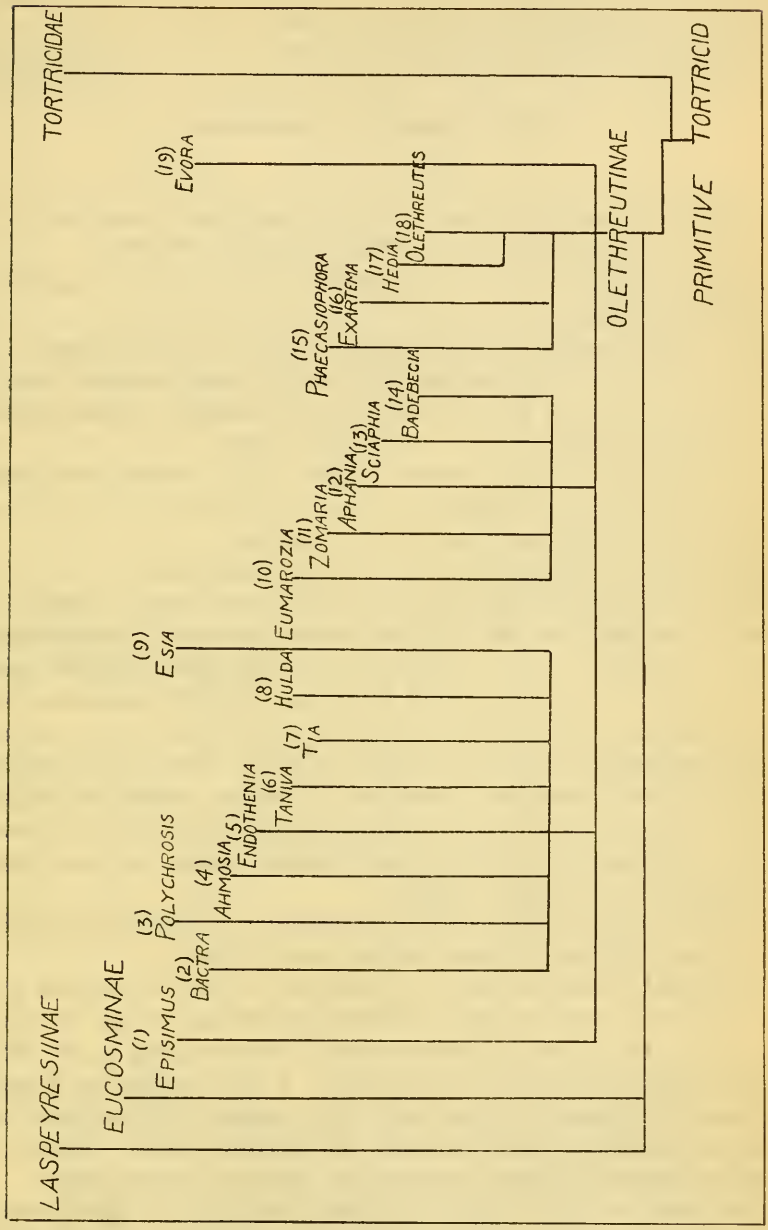

FIG. 2.—PHYLOGENETIC TREE OF THE OLETHREUTINAE

15. Hind tibia of male swollen with scale tuftings_____ (15) **Phaecasiophora.**
Hind tibia of male smooth scaled_____ 16.
16. Bursa of female with two signa_____ (17) **Hedia.**
Bursa of female with single signum or none_____ 17.
17. Hind wing of male with projecting basal lobe_____ (16) **Exartema.**
Hind wing of male without projecting basal lobe_____ (18) **Olethreutes.**

1. Genus EPISIMUS Walsingham

(Figs. 21, 22, 39)

Episimus Walsingham, Proc. Zool. Soc. London, 1891, p. 501, 1897, p. 122.
Genotype.—Carpocapsa transferrana Walker (Brazil).

Thorax smooth above; with expansible tuft from near head below base of fore wing.

Fore wing smooth; termen concave; 12 veins, all separate; 7 to termen; 7, 8, and 9 approximate at base; upper internal vein of cell from between 10–11; 3, 4, and 5 approximate at termen; 2 from cell near ½, straight or but very slightly bent.

Hind wing with 8 veins; 6 and 7 approximate towards base; 3 and 4 connate (stalked in *tyrius*); 5 closely approximate to 4 at base; male without chitinous ridge at inner margin.

Hind tibia of male without hair pencile from base.

Male genitalia with harpe narrowly elongate; outer surface unspined; cucullus long and narrow, finely and evenly spined, apex evenly rounded; sacculus with a few long, flat, hairlike spines (*ScSp*) from base; spine cluster Spc^1 upon a slight projection from lower margin of harpe beyond base; spine cluster Spc^2 absent. Uncus developed, rather long, slender, simple. Socii broad, flexible, heavily haired. Gnathos moderately chitinized, somewhat reduced and terminating in a narrow, tapering, finely pointed, flat subanal plate. Aedoeagus moderately long, straight; cornuti a dense cluster of long slender deciduous spines.

Female genitalia with two thornlike signa. Ductus bursae rather short, with a chitinized collar at juncture of bursa.

A tropical American genus represented in North America by a few species of West Indian or Central American origin. In addition to the three here treated several others common to the West Indies probably inhabit lower Florida. I have before me a badly mutilated specimen of what looks like *nesiotes* Walsingham, and three specimens of an apparently undescribed species. They are all in too poor condition, however, for definite determination.

The genus is a very compact, clearly defined one. The genitalia throughout are of a uniform type with very slight specific differences. The pattern (fig. 22) also is remarkably consistent and typical. Its striking feature is an ocelloid patch on fore wing, con-

sisting of a pale area at tornus with a more or less pronounced dark central spot, a partially encircling dark band and, above this, two or more black dots or streaks, the whole reaching well up toward apex at termen, bounded inwardly by more or less metallic scaling and above by a narrow dark curved band extending to termen. Specific differences in color and markings are often slight but appear to be consistent.

On several characters (the smooth thorax, distinctly concave termen, approximate condition of veins 3, 4, and 5 at termen, and the strongly marked ocelloid patch of fore wing) *Episimus* would go as well in Eucosminae as in Olethreutinae. The male genitalia are, however, more olethreutine than otherwise, and in all the species that I have seen except one (*tyrius*) veins 3 and 4 of hind wing are distinctly connate. In *tyrius* they are stalked.

The genus, therefore, while it lies close to the Eucosminae and shows certain affinities to the *Epinotia* branch of that subfamily should be regarded as part of the Olethreutinae.

I should perhaps mention that the tuft on thorax under fore wing and which Walsingham gives as a distinguishing character for *Episimus* occurs in practically all Olethreutinae as a simple scale-tuft. In *Episimus*, however, it has more or less of a mixture of hair and scales and in some species the hairs are very thick and long (*transferranus* and *nesiotes* for example).

KEY TO THE SPECIES OF EPISIMUS

1. Fore wing with a conspicuous, rounded, dark spot on dorsum just before middle ..... (2) **augmentanus.**
   Fore wing without such ..... 2.
2. Fore wing with a large reddish purple costal patch covering most of basal half of wing; dorsal area bordering this patch, whitish; hind wing with veins 3 and 4 stalked ..... (3) **tyrius.**
   Fore wing with costal patch an obscure dark smudge on midcosta; dorsal margin at base not whitish; hind wing with 3 and 4 connate.
   (1) **argutanus.**

1. EPISIMUS ARGUTANUS (Clemens)

(Figs. 183, 392)

Bactra? argutana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 358.—Packard, Fifth Rep. U. S. Ent. Comm., 1890, p. 282.

Catastega hamameliella Clemens, Proc. Ent. Soc. Philadelphia, vol. 1, 1861, p. 87; Tin. N. Amer., 1872, p. 178.—Dyar, Proc. Ent. Soc. Washington, vol. 5, 1903, p. 128.—Fernald, in Dyar List N. Amer. Lepid., no. 5807, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7279, 1917.

Grapholitha (Hedya) allutana Zeller, Verh. Zool.-bot. Ges. Wien, 1879, p. 295.

Episimus argutanus Dyar, Proc. Ent. Soc. Washington, vol. 4, 1901, p. 469.—Fernald, in Dyar List N. Amer. Lepid., no. 5207, 1903.—Kearfott, Ins. New Jersey, 1910, p. 543.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7110, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 447.

Enarmonia argutana Walsingham, Biol. Cent. Amer. Lepid. Heter., vol. 4, 1914, p. 238.

A rather common species and probably the most widely distributed of all, occurring throughout North and Central America and the West Indies. Dyar has suggested the synonymy of *hamameliella* and *argutana* and in this is without doubt correct. Several of the moths in the National Collection were reared from *Hamamelis*. The favorite food plant, however, seems to be sumac (*Rhus glabra* and *R. copalina*, less frequently *R. toxicodendron*). There is some little color variation in different specimens due to the amount of dark dusting upon fore wing; but the pattern markings otherwise are uniform.

Male genitalia figured from specimen in collection Barnes from Shasta Retreat, Siskiyou County, Calif. ("June 16–23"); female from reared specimen in National Collection from Glencarlyn, Va. (on *Rhus copalina*, Hopk. U. S. no. 12133, June 10, 1914, Heinrich).

Distribution.—Florida, North Carolina, Virginia, Maryland, District of Columbia, Pennsylvania, New Jersey, New York, Maine, Illinois, Missouri, Texas, New Mexico, Colorado, California, Manitoba, Ontario.

Alar expanse.—11–15 mm.

Types.—In Academy Natural Science, Philadelphia (*argutanus*); British Museum (*allutana*).

Type localities.—Pennsylvania (*argutanus*, *hamameliella*); Texas (*allutana*).

Food plants.—*Rhus*, *Hamamelis*, *Crataegus*, *Ulmus*, *Solidago*, *Euphorbia heterophylla*.

2. EPISIMUS AUGMENTANUS (Zeller)

(Fig. 393)

Grapholitha (*Hedya*) *augmentana* Zeller, Hor. Soc. Ent. Ross., vol. 13, 1877, p. 160.

Episimus augmentanus Dyar, Proc. Ent. Soc. Washington, vol. 4, 1901, p. 468.—Fernald, in Dyar List N. Amer. Lepid., no. 5206, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7109, 1917.

Represented in the National Collection by two reared males from Palm Beach, Fla. (Dyar, no. 843, iss. Feb. 25 and 27, 1900). These are the only North American specimens I have seen. Male genitalia figured from one of the above.

The species is very similar in pattern to the tropical *transferranus* Walker, but is apparently distinct.

Alar expanse.—14–15 mm.
Type.—In collection Staudinger.
Type locality.—Cuba.
Food plant.—Metopium toxiferum ("*Rhus metopium*").

3. EPISIMUS TYRIUS Heinrich

(Fig. 187)

Episimus tyrius Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 107.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 447.

So far represented by the type in the Cornell Collection, a female paratype from St. Petersburg, Fla., in the Barnes Collection, a male from Biloxi, Miss. (June 13, 1917), also in the Cornell Collection, and a male and female from the Fernald Collection in the National Museum (these last are part of the same reared series as the type. They have been partially eaten by a Dermestid but wings and abdomens are intact). In all specimens veins 3 and 4 of hind wing are stalked, a very exceptional character in this subfamily and here apparently a specific rather than an individual aberration.

Female genitalia figured from type. Male genitalia similar to that of *transferranus* (fig. 39), but with slightly heavier spine-tuft. *Spc.*[1]

Alar expanse.—14–15 mm.
Type.—In collection Cornell University.
Type locality.—Westbury Station, Queens County, N. Y.
Food plant.—Acer dasycarpum.

2. Genus BACTRA Stephens

(Figs. 44, 45, 46, 47, 49, 342)

Bactra Stephens, Illus. Brit. Ent., vol. 4, 1834, p. 124.
Genotype.—Tortrix lanceolana Hübner (Europe).

Thorax smooth.

Fore wing smooth; termen straight; 12 veins, all separate; 7 to termen; 8 and 9 approximate (but not closely so); 10 well separated from 9 but closer to 9 than to 11; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell slightly before ⅔, straight.

Hind wing with 8 veins; 6 and 7 stalked; 3 and 4 separate; 3, 4, and 5 approximate at base and equidistant; male without chitinous ridge at inner margin.

Hind tibia of male without hair pencile from base.

Male genitalia with harpe short and stout; outer surface unspined: cucullus broad, strongly spined along lower margin; sacculus broad,

weakly haired at base; spine cluster *Spc*[1] rarely absent (in type and *furfurana*), when present developed as a strong ridge of spines upon a free arm projecting over cucullus; spine cluster *Spc*[2] present. Tegumen short, broad, roundly arched. Uncus short, stout, with a row of strong spines on inner side at margin. Socii small, flexible, weakly haired. Gnathos simple, weakly chitinized. Aedoeagus moderately long to very long, stout, more or less curved; cornuti a cluster of two or more short spines, rarely absent.

Female genitalia with signum a small flat scobinate patch. Ductus bursae moderately long, simple.

A compact easily distinguished genus of rather wide distribution, showing, in genitalia at least, rather marked affinities to *Endothenia*. The male genitalia are quite characteristic. There appear to be two types of harpe: the *lanceolana* type with spine group *Spc*[1] absent and the cucullus spines dense and slender; and the *verutana* type with *Spc*[1] strongly developed and upon a free arm, and with the cucullus spines fewer but extremely stout (compare figs. 44, 46). Otherwise the genitalia are of the same general type, with slight but clear-cut specific differences.

In pattern and markings the species are variable, and grade into each other. This has caused considerable misidentification and confusion. Except for the more strongly and characteristicly marked specimens, accurate and certain determination is only possible by means of the genitalia. The following specific key is drawn for such typically marked examples, and will help to identify them, but will not serve for all specimens of any given species.

KEY TO THE SPECIES OF BACTRA

1. Fore wing with outwardly angulate dark basal patch; if incomplete, at least indicated by outer dark margin on costal half ..... (2) **furfurana.**
   Fore wing without such basal patch; dark basal markings not reaching to costa ..... 2.
2. Fore wing with a strong, straight, continuous, central longitudinal fuscous shade from base to apex ..... 3.
   Fore wing without such; where there is a continuous dark streak from base to apex the latter is sharply angulate at end of cell ..... 4.
3. Dark costal geminations on fore wing very short ..... (6) **maiorina.**
   Dark costal geminations long ..... (7) **priapeia** (part).
   (8) **sinistra.**
4. Fore wing with a conspicuous white dot at end of cell.
   (4) **verutana albipuncta.**
   Fore wing without such ..... 5.
5. Dark markings on disk forming a more or less interrupted longitudinal streak, or a longitudinal streak at base and a short transvere streak across end of cell, hooked at its lower extremity ..... (1) **lanceolana.**
   Dark markings on disk two round or elongate blackish spots, one near base, the other at end of cell ..... 6.

6. General color of fore wing pale cinereous ocherous; dark dusting blackish fuscous ---------- (3) **verutana** (typical). (7) **priapeia** (part).
General color of fore wing pale brownish ocherous; dark dusting more brown than black---------- (5) **verutana chrysea**.

1. BACTRA LANCEOLANA (Hübner)

(Figs. 44, 342)

Tortrix lanceolana Hübner, Samm. Eur. Schmet., Tort., 1800, fig. 80.
Bactra lanceolana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 2017, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5006, 1903.—Pierce and Metcalfe, Genitalia Brit. Tort., 1922, p. 40, pl. 14.

Pierce's figures of the genitalia fix the concept of this species to a form with broad, roundly arched incurvation on lower margin of harpe between sacculus and cucullus. In *furfurana*, which is very close in genitalia, pattern, and general habitus, the lower margin of harpe is angulate and there is no incurvate or definable neck area (comp. figs. 44, 45). European and American workers have frequently confused the two species, identifying suffused and weakly marked *furfurana* as *lanceolana*. The latter occurs here, but is quite rare. All the American specimens I have seen under the name are referable elsewhere, some few to *maiorina*, but the greater number to *furfurana* or *verutana* (var. *albipuncta*). The majority of the European specimens in our collections under *lanceolana* (and so labeled by European workers) are also *furfurana*.

Male genitalia figured from specimens in National Collection from British Columbia (E. H. Blackmore, "60, F–13–VIII–20").

This is the only authentic American specimen I have seen.

Alar expanse.—15 mm.

Type.—Location unknown.

Type locality.—Europe.

Food plant.—*Juncus.*

2. BACTRA FURFURANA (Haworth)

(Figs. 45, 170, 343)

Tortrix furfurana Haworth, Lepid. Brit., 1811, p. 466.
Bactra furfurana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 2020, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5007, 1903.—Pierce and Metcalfe, Genitalia Brit. Tort., 1922, p. 40, pl. 14.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 470.

A common species throughout the United States. The characters given in our key will distinguish the more strongly marked specimens (that is, those with complete basal patch, and median bar extending to costa); but the species is quite variable and specimens marked like typical *lanceolana* are not uncommon. In fact these are

usually wrongly identified as *lanceolana*. For accurate and certain determination of any *Bactra* a genitalia preparation is necessary. Fortunately these organs (both male and female) show good specific differences.

Male and female genitalia figured from specimens in National Collection from Europe (male) and Washington, D. C. (August Busck, July, female).

Distribution.—Ontario, District of Columbia, South Dakota, Illinois, Tennessee, Missouri, Louisiana, Alabama, Texas, Montana, California.

Alar expanse.—10–16 mm.

Type.—In British Museum.

Type locality.—England.

Food plant.—*Juncus.*

3. BACTRA VERUTANA Zeller

(Figs. 47, 171, 346)

Bactra lanceolana verutana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 247.—Fernald, in Dyar List N. Amer. Lepid., no. 5006, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6789, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 470.

A common species in Florida and the other Gulf States. The typical form occurs rarely in northern localities. Described as a variety of *lanceolana* and so listed in our catalogues. It is, however, quite distinct.

Male and female genitalia figured from specimens in National Collection from Orlando, Fla. (G. G. Ainslie, March, 1914, male, and "2–2–18," female).

Distribution.—Florida, Texas, Mississippi, Louisiana, North Carolina, Indiana, Missouri, Ontario, Alberta.

Alar expanse.—11–17 mm.

Type.—In British Museum.

Type locality.—Dallas, Tex.

Food plant.—*Cyperus* (U. S. Bureau of Entomology rearing).

4. BACTRA VERUTANA ALBIPUNCTA, new variety

(Figs. 46, 347)

A Rocky Mountain race of *verutana*, with darker head (pale brownish ocherous) and with brownish fuscous rather than blackish markings on fore wing. In well-marked specimens the outer discal dark spot is continued in a dark shade to mid costa and there is a distinct white dot at end of cell. The chief differences, however, are in the male genitalia. In *albipuncta* spine cluster *Spc*[2] is grouped on the outer margin of the raised area of sacculus while in

typical *verutana* it is on or very near the basal margin (comp. figs. 47, 46). The spining of cucullus is also stouter in *albipuncta*. There are no significant differences in female genitalia.

Male genitalia figured from paratype in National Collection ("Colo. 2527").

Alar expanse.—14–18 mm.

Type and paratypes.—Cat. No. 28026, U.S.N.M. Paratype also in American Museum, collection Barnes, and Canadian National Collection.

Type locality.—Denver, Colo.

Described from male type and 8 male and 1 female paratypes from the type locality (Oslar, collector); 1 male paratype labeled, "Colo. 2527;" 3 female paratypes from Vineyard, Utah; 2 male paratypes from Eureka, Utah; 5 male paratypes from Deer Creek, Provo Canon, Utah; and 1 male paratype from Stockton, Utah (all Utah specimens collected by Tom Spalding and bearing various July dates).

The above out of a large series which had been in the collections under either *lanceolana* or *furfurana*. I have also before me a few specimens from Arizona.

Several genitalia slides were made from specimens from the different localities. In all, the distinguishing male characters were found to be constant.

5. BACTRA VERUTANA CHRYSEA, new variety

(Figs. 49, 348)

A California race of *verutana*.

Like *albipuncta* but paler, more uniformly yellowish, and with white dot on outer margin of cell obsolete or very faint. Male genitalia with lower margin of cucullus of harpe right angulate (in *albipuncta* and *typical verutana* it is more evenly rounded); spine cluster *Spc*[2] also more scattered in middle of raised area of sacculus.

Male genitalia figured from type.

Alar expanse.—16–18 mm.

Type.—In collection Barnes.

Paratypes.—Cat. No. 28027, U.S.N.M. Also in American Museum and collection Barnes.

Type locality.—Loma Linda, Calif.

Described from male type and 9 female paratypes from the type locality dated "March 24–30" (type), "Aug. 24–31" (1 paratype), "Sept. 1–7" (2 paratypes), "Sept. 16–23" (3 paratypes), "Sept. 24–30" (1 paratype), "Oct. 8–15" (1 paratype), and "Oct. 16–23" (1 paratype); and one female paratype from Laguna Beach, Calif. (Baker, no date).

6. BACTRA MAIORINA Heinrich

(Figs. 173, 344)

Bactra maiorina Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 105.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 470.

A distinct species, as the genitalia show. In the male the aedoeagus is longer and more curved, spine cluster *Spc*[2] is stronger and the heavy spining of cucullus more closely crowded toward lower margin than in any of the varieties of *verutana*. The differences in female genitalia are shown in figures 171, 173.

Apparently confined to the single food plant (*Scirpus*) and possibly the same as the European *scirpana* Herrich-Schaefer, now listed as a synonym of *furfurana*. A genitalia study of European specimens reared from *Scirpus* would be necessary to establish this.

Male genitalia figured from paratype in collection Barnes from Vineyard, Utah (Tom Spalding, "VI–2–12"); female from paratype in collection Barnes from Arlington, Va.

Distribution.—Virginia, Indiana, Illinois, Missouri, Utah. There is also a specimen in the Cornell collection from Ithaca, N. Y.

Alar expanse.—13–20 mm.

Type.—In National Collection.

Type locality.—Arlington, Va.

Food plant.—*Scirpus fluviatilis.*

7. BACTRA PRIAPEIA Heinrich

(Figs. 172, 345)

Bactra priapeia Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 105.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 470.

Since the publication of this species a large number of *Bactra* collected at San Benito, and Brownsville, Tex., have been received from Dr. W. Barnes. Most of the specimens were *verutana* or *furfurana* (dated May to September). The females of *priapeia* in this lot showed quite different genitalia from those of the female paratypes of the original type series. Inasmuch as the Texas females are in large series (equal in number to the males), I take it that they must be the true females of *priapeia*, and that the paratype from the type locality is something else, possibly a hybrid of *priapeia* and *verutana* or of *verutana* and *furfurana*. I am designating it as a new species under the name *sinistra* (see following).

In pattern *priapeia* is somewhat variable, several specimens having the median dark shade of forewing broken into two discal dots or blotches as in *verutana*. The abnormally long aedoeagus of the male and the strongly chitinized ductus bursae of the female, however, are diagnostic and readily identify the species.

Genitalia figured from specimens in National Collection from Sabine River Ferry, La. (June 20, 1917, male paratype), and San Benito, Tex. ("July 16–23," female).

Distribution.—Texas, Louisiana, Florida. In the National Collection there is also a well-matched pair (male and female) from Corazal, Canal Zone, Panama (August Busck, collector).

Alar expanse.—16–24 mm.

Type.—In collection Cornell University.

Type locality.—Sabine River Ferry, La.

8. BACTRA SINISTRA, new species

(Fig. 174)

Similar to male of *B. priapeia* and only to be distinguished from that species by the female genitalia. These are quite characteristic, however. The peculiar structures are shown in our figure. All pattern markings like those of male of *priapeia;* fore wing with a median longitudinal dark fuscous streak from base to apex.

Alar expanse.—16–17 mm.

Type and paratype.—Cat. No. 28028, U.S.N.M. Paratype also in Cornell University and Barnes collection.

Type locality.—Sabine River Ferry, La.

Described from female type (Cornell University Lot 542, Sub 20); one female paratype from Biloxi, Miss. (Cornell University Lot 542, Sub 11); and two female paratypes from Gulfport, Miss. (F. H. Benjamin).

I should not name this form were it not for the fact that the type had been wrongly referred as a paratype of *priapeia* Heinrich, and that two other specimens had been sent out under that name. I believe it is only a hybrid of *priapeia* and *verutana* (or *verutana* and *furfurana*); but as this is by no means certain, a separate specific designation must be given.

3. Genus POLYCHROSIS Ragonot

(Figs. 12, 15, 19, 20, 41, 358)

Polychrosis Ragonot, Ann. Ent. Soc. France, vol. 63, 1894, p. 209.
Genotype.—Tortrix botrana Schiffermüller (Europe).

Thorax with posterior crest.

Fore wing smooth; termen convex; 12 veins, all separate (rarely 8 and 9 connate); 7 to termen; 7, 8, and 9 approximate; 10 remote from 9; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell slightly beyond ⅔, somewhat bent.

Hind wing with 8 veins; 6 and 7 approximate toward base (rarely anastomosing beyond cell); 3 and 4 separate; 3, 4, and 5

equidistant and well separated; male without chitinous ridge at inner margin.

Hind tibia of male with short hair pencile from base.

Male genitalia with harpe moderately long; outer surface unspined; cucullus well spined throughout, apex evenly rounded; sacculus normally with a strong tuft of hairlike spines from base; spine clusters *Spc*[1] and *Spc*[2] strongly developed, produced from neck (*Spc*[2] rarely absent). Uncus reduced, weakly chitinized, finely spined beneath. Socii absent. Gnathos simple. Aedoeagus long, slender, slightly curved; cornuti absent.

Female genitalia without signum. Ductus bursae moderately long, simple.

Abdomen (of male) with a narrow elongate pocket of papilliform hairs on each side of basal segment (fig. 15).

The above description is drawn for the American species, which differ rather markedly from the type (*botrana*) in both fore-wing venation and genitalia and probably should have separate generic rank. The European species have similar genitalia to *botrana*; but nothing has quite the same fore-wing venation (10 approximate to 9). Neither do they agree any better with the type of *Lobesia* (*permixtana* Hübner); *artemesiana* Zeller and *kreithneriana* Hornig have similar fore-wing venation (10 and 11 approximate), but lack the peculiar trigonate hind wing of *permixtana*. Eventually we shall probably have to restrict the two genera (*Polychrosis* and *Lobesia*) to their respective types and find new designations for the species now referred to them. For the present or until such time as the exotic forms can be carefully studied and generic limits exactly defined, I think it better to keep our American species under *Polychrosis*.

Meyrick in his Australian Revision[10] gives, as one of the characters of *Polychrosis*, 6 and 7 of hind-wing connate or stalked. I do not know how this applies to eastern species. It does not for the European or American. In the type and most of the other species 6 and 7 are clearly tortriciform (approximate toward base). Rarely (in specimens, and possibly holding for individual species) they anastomose slightly beyond the cell.

KEY TO THE SPECIES OF POLYCHROSIS

1. Basal two-thirds of fore wing ashy gray; without dark median band. (14) cyclopiana.
   Basal two-thirds of fore wing not ashy gray; dark median band present. 2.
2. Basal patch and antemedian band of fore wing concolorous and coalesced ..... 3.
   Basal patch and antemedian band not concolorous; both defined to the naked eye ..... 7.

[10] Proc. Linn. Soc. N. S. W., vol. 36, 1911, p. 256.

3. Head and thorax a uniform ferruginous ocherous_____ (1) liriodendrana.
Head and thorax pale ocherous or purplish fuscous dusted with ocherous_____ 4.
4. Median band of fore wing well separated from pretornal spot by a metallic band as broad as dorsum of median band_____(2) viteana.
Median band more or less coalescing with pretornal spot, the intervening metallic band narrow and dusted with ocherous and brownish scales_ 5.
5. Fore wing with costa markedly rounded toward apex; veins 8 and 9 very closely approximate at base, practically connate; 7 and 8 more separated; median band slightly broader on costa than dorsum. Hind wing blackish fuscous_____ (3) monotropana.
Fore wing with costa only slightly rounded (nearly straight toward apex: veins 8 and 9 separate at base, further apart than 7 and 8; median band narrower on costa than dorsum. Hind wing brownish (smoky) fuscous, decidedly paler toward base_____ 6.
6. Subapical spot much dusted with blackish, concolorous with median band. (5) rhoifructana.
Subapical spot with little or no blackish dusting, paler than median band. (4) cypripediana.
7. Hind wing smoky only toward apex; distinctly white toward base_____8.
Hind wing smoky throughout; not appreciably whitish toward base____ 9.
8. Fore wing with dark pattern markings distinctly bordered with white; alar expanse under 12 mm_____ (6) yaracana.
Fore wing with no white borders to dark pattern markings; alar expanse 15 mm. or over_____ (13) blandula.
9. No white scaling whatever upon fore wing; pale dashes bordering outer costal spots, ocherous_____ (11) slingerlandana.
Some white scaling upon fore wing; pale dashes (those bordering outer costal spots at least) white; sometimes median and basal dark markings faintly edged with white_____ 10.
10. Subapical spot uniformly blackish brown_____ (12) carduana.
Subapical spot paler; sometimes with shading or dotting of black scales, but not uniformly blackish or blackish brown_____ 11.
11. Dorsal half of median band bright ocher yellow_____ (10) aruncana.
Dorsal half of median band not bright ocher yellow_____ 12.
12. Subapical spot showing considerable black scaling, as dark as median band_____ 13.
Subapical spot without (or with but the faintest trace of) black scaling, paler than median band_____ (7) spiraeifoliana.
13. Antemedian band paler on dorsum than costa, appearing to the naked eye as a round whitish dorsal spot_____ (8) aemulana.
Antemedian band no paler on dorsum than costa, lead colored throughout. (9) vernoniana.

1. POLYCHROSIS LIRIODENDRANA Kearfott

(Figs. 175, 361)

Polychrosis liriodendrana Kearfott, Trans. Amer. Ent. Soc., vol. 30, 1904, p. 293.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6780, 1917.—Forbes, Memoir 68 Cornell Univ. Agr. Exp. Sta., 1924, p. 473.

Polychrosis magnoliana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 6.—Barnes and McDunnough, Check List. Lepid. Bor. Amer., no. 6781, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 473.

I have examined the types of Kearfott's two species carefully and can see no real difference between them, genitalic or otherwise, except size. *P. liriodendrana* is somewhat larger; but in reared series from *Liriodendron* we have specimens quite as small as any from *Magnolia*. The larvae feed commonly upon the leaves, rarely in the seed pods.

Male genitalia with long tuft from base of sacculus of harpe; arch of neck wide; spine cluster *Spc*[2] absent; aedoeagus smooth.

Genitalia figured from reared specimens in National Collection from Falls Church, Virginia (Hopk. U. S. no. 11149, Heinrich, June 28, 1913, male) and Montclair, New Jersey ("K–672, iss. VIII–10," Kearfott, female).

Distribution.—New Jersey, Pennsylvania, District of Columbia, North Carolina.

Alar expanse.—10–14 mm.

Types.—In American Museum.

Type locality.—District of Columbia (*liriodendrana* and *magnoliana*).

Food plants.—*Liriodendron tulipifera*, *Magnolia virginiana*.

2. POLYCHROSIS VITEANA (Clemens)

(Figs. 12, 182, 362)

Endopiza? viteana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 359.

Penthina vitivorana Packard, Guide Study Ins., 1869, p. 336.—Riley, Rep. Ins. Missouri, vol. 1, 1869, p. 133.—Walsh and Riley, Amer. Ent., vol. 1, 1869, p. 177.

Polychrosis botrana Fernald (and Authors, not Schiffermüller), in Dyar List N. Amer. Lepid., no. 5005, 1903.

Polychrosis viteana Kearfott, Trans. Amer. Ent. Soc., vol. 30, 1904, pp. 287–293.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6779, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 473.

The common American grape berry moth of economic literature. For a number of years, until Kearfott pointed out its distinctness, it had been confused with the European *botrana*. The two species differ radically in both genitalia (compare figs. 358, 362) and venation; *botrana* having vein 10 of fore wing rather close to 9 at base, while *viteana* has it well separated, if anything nearer 11.

Male genitalia with weak spining on base of sacculus of harpe; spine clusters *Spc*[1] and *Spc*[2] strongly developed, arch between them narrow; a third cluster consisting of two heavy, flat, sword-like, closely grouped spines arising from harpe at base of cucullus; aedoeagus with small projecting tooth on upper edge near apex.

Male and female genitalia figured from reared specimens in National Collection from Northeast Pennsylvania ("X–16," Cushman).

Distribution.—Massachusetts, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Michigan, Missouri.

Alar expanse.—10–14 mm.

Types.—In Academy Natural Science (*viteana*); Museum Comparative Zoology (*vitivorana*).

Type localities.—Pennsylvania (*viteana*); Hudson, Ohio (*vitivorana*).

Food plant.—*Vitis.*

3. POLYCHROSIS MONOTROPANA, new species

(Fig. 366)

Antenna, palpus, and face brownish ocherous; basal joint of antenna blackish above. Head and thorax brownish ocherous dusted with purplish scales. Fore wing with costa markedly rounded near apex; basal and antemedian areas metallic blue; a faint, narrow, scarcely angulate, black band indicating outer margin only of usual basal patch, disappearing toward dorsum; antemedian area with central black gemination and a couple of faint white geminations on costa, otherwise unmarked; median band wider on costa than dorsum, brown heavily dusted with black; outer costal spots broad, brown dusted with black; subapical spot large, broadly oval, connected at middle with termen and joining first and second outed costal spots above, brown heavily dusted with black; triangular pretornal spot brown, well dusted with black; cilia dark metallic purple. Hind wings blackish fuscous; cilia white with very dark basal band.

Male genitalia of type figured. Harpe with short tuft from base of sacculus; spine clusters *Spc*^{1} and *Spc*^{2} well developed, arch between them wide, aedoeagus smooth.

Female genitalia as in *spiraeifoliana* except genital plate somewhat larger and stouter.

Alar expanse.—9.5–10 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28029 U.S.N.M.

Type locality.—Cincinnati, Ohio.

Food plant.—*Monotropa uniflora* (larvae in seed capsules).

Described from male type from the type locality (A. F. Braun, "VIII–24–07"); and two female paratypes from Cabin John Bridge, Md. (R. M. Fouts, Aug. 22, 1923), all reared.

In genitalia not to be distinguished from the following species, but with different wing shape, darker hind wings, and slightly different fore wing venation (8 and 9 more closely approximated at base).

4. POLYCHROSIS CYPRIPEDIANA Forbes

(Figs. 15, 367)

Polychrosis cypripediana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 473.

Like the preceding (*monotropana*) in color, pattern, and genitalia, but with paler hind wings and less black dusting on dark areas of fore wing. There is little or no black scaling on subapical spot, and the latter is considerably paler than the median band. Veins 8 and 9 of fore wing while not far apart at base are still distinctly separate and farther apart than 7 and 8. The termen is also straighter near apex. In pattern, color, and wing structure it is still closer to *rhoifructana*, but is easily distinguished from the latter by the male genitalia having a short tuft on base of sacculus.

The female genitalia are as in *monotropana.*

Male genitalia of type figured

Alar expanse.—9–10.5 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28030, U.S.N.M. Also in American Museum collection Barnes and Canadian National Collection.

Type locality.—Aweme, Manitoba.

Food plant.—*Cypripedium* (larvae feeding on seeds).

Described from male type, 2 male and 4 female paratypes all reared and from the type locality and dated as follows: type and 1 male and 1 female paratypes, "Jan. 14–09"; 1 male paratype, "Jan. 1–09"; 2 female paratypes, "14–IV–07"; 1 female paratype, "Jan. 1906, from larva collected 25 Aug. 1905". (N. Criddle).

These specimens Kearfoot had set aside as a new species under the manuscript named *cypripediana*, validated by Forbes and therefore credited to him. Inasmuch as Forbes designated no types, I do so here. Several of the specimens are in poor condition. The mid-winter issuing dates are probably due to indoor rearing.

5. POLYCHROSIS RHOIFRUCTANA Kearfott

(Figs. 176, 372)

Polychrosis rhoifructana Kearfott, Trans. Amer. Ent. Soc., vol. 30, 1904, p. 296.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6786, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 473.

Larvae feed in the fruits of Sumac and occasionally upon seeds of *Cornus* and *Kalmia.* Reared specimens from the last two Kearfott had set aside as new species; but there is nothing upon which to separate them from typical *rhoifructana.*

Male genitalia with long tuft from base of sacculus of harpe; spine clusters *Spc*[1] and *Spc*[2] strongly developed; arch between them wide; aedoeagus smooth.

Male and female genitalia figured from reared specimens in National Collection from Washington, D. C. ("3257" male type) and Falls Church, Va. (*Rhus*, Hopk. U. S. No. 12196, Heinrich, female).

Distribution.—District of Columbia, Virginia, Pennsylvania, New York, New Jersey, Rhode Island, Connecticut, Maine, Ohio.

Alar expanse.—9–12 mm.

Type.—In National Collection.

Type locality.—Washington, D. C.

Food plants.—*Rhus*, *Kalmia*, *Cornus*.

6. POLYCHROSIS YARACANA Kearfott

(Fig. 370)

Polychrosis yaracana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 5.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6784, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

Polychrosis signifera Meyrick, Ent. Mo. Mag., vol. 48, 1912, p. 34.

Easily recognized by white hind wing with smoky shade at apex and white scaling on fore wing. Male genitalia with long tuft from base of sacculus of harpe; spine cluster *Spc*[1] and *Spc*[2] well developed, arch between them narrow; aedoeagus smooth.

Male genitalia figured from specimen in National Collection from Oak Station, Pennsylvania (F. Marloff, "VI–2–12"). Female genitalia like those of *spiraeifoliana*.

Distribution.—Ohio, Pennsylvania, New York, Ontario.

Alar expanse.—9–11 mm.

Type.—In American Museum.

Type locality.—Cincinnati, Ohio.

7. POLYCHROSIS SPIRAEIFOLIANA Heinrich

(Figs. 178, 360)

Polychrosis spiraeifoliana Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 106.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

Male genitalia with moderately long tuft (half the length of that of *rhoifructana*) from base of sacculus of harpe; spine clusters *Spc*[1] and *Spc*[2] well developed; arch between them angulate but wide; sacculus but slightly rounded; aedoeagus with slight tooth on side.

Male genitalia figured from type; female from paratype in National Collection from Hampton, N. H. (S. A. Shaw, "8–9–1905.").

Distribution.—Pennsylvania, New Jersey, New Hampshire.
Alar expanse.—8–10 mm.
Type.—In collection Barnes.
Type locality.—Hazelton, Pa.
Food plant.—*Spiraea salicifolia.*

8. POLYCHROSIS AEMULANA, new species

(Figs. 180, 369)

Superficially like *vernoniana* and *spiraeifoliana* and hardly to be distinguished except by genitalia. The latter, however, easily identify it. The diagnostic pattern characters (such as they are) are given in the key.

Male genitalia with sacculus of harpe but slightly rounded, a moderately long tuft from base; spine clusters Spc^1 and Spc^2 set close together, arch between them narrowly angulate; aedoagus with a round spine projecting downward from lower margin at apex.

Male genitalia of type figured. Female genitalia figured from paratype in collection Barnes from Essex County Park, N. J.

Alar expanse.—9–10 mm.
Type.—In American Museum.
Paratype.—Cat. No. 28031, U.S.N.M. Also in collection Barnes.
Type locality.—Hazelton, Pa.

Described from male type and one female paratype from the type locality (Dietz, "7–3–05") and one female paratype from Essex County Park, N. J. (Kearfott, June 3).

9. POLYCHROSIS VERNONIANA Kearfott

(Figs. 177, 371)

Polychrosis vernoniana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 7.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6787, 1917.

Polychrosis ambrosiana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 8.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6788, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

There are no differences in genitalia or pattern between Kearfott's two supposed species.

Male genitalia figured from paratype (of *ambrosiana*) in National Collection from the type locality; as in *spiraeifoliana* except with sacculus more angulate, basal tuft longer, and arch between spine clusters Spc^1 and Spc^2 round rather than angulate.

Female genitalia figured from paratype (of *ambrosiana*) in the American Museum.

Distribution.—New Jersey, Pennsylvania, District of Columbia, Ohio, Missouri.

Alar expanse.—8–11.

Types.—In American Museum.

Type localities.—Caldwell, New Jersey (*vernoniana*); Cincinnati, Ohio (*ambrosiana.*)

Food plants.—Veronia noveboracensis, Ambrosia trifida (larvae feeding upon seeds).

10. POLYCHROSIS ARUNCANA Kearfott

(Fig. 365)

Polychrosis aruncana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 5.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6783, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

Distinguished by the bright ocher yellow dusting on median band of fore wing. Male genitalia as in *spiraeifoliana* except basal tuft on sacculus very short and spine clusters *Spc*[1] and *Spc*[2] set closer together; figured from paratype in National Collection.

Female genitalia as in *spiraeifoliana.*

Paratypes from type locality in National Collection, American Museum, and collection Barnes.

Alar expanse.—8.5–11 mm.

Type.—In American Museum.

Type locality.—Cabin John Bridge, Md.

Food plant.—Aruncus aruncus (larvae in seeds).

11. POLYCHROSIS SLINGERLANDANA Kearfott

(Figs. 179, 359)

Polychrosis slingerlandana Kearfott, Trans. Amer. Ent. Soc., vol. 30, 1904, p. 295.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6782, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

Among Kearfott's cotypes is one specimen (in the National Museum) collected by August Busck at Plummer Island, Md., which does not belong here. It is a runted male of *Endothenia hebesana* Walker. The rest of his material is reared and authentic.

Male genitalia figured from specimens in American Museum from Essex County Park, N. J. ("K–257, iss. VIII–5–02"); with very short tuft from base of sacculus; spine clusters *Spc*[1] and *Spc*[2] well developed; arch between them broad and rounded; aedoeagus with a prominent emarginate projection on upper edge at apex.

Female genitalia figured from paratype in National Collection from the type locality ("K–257, VIII–9").

Specimens in the National Collection, American Museum, and collection Barnes from New Jersey.

Alar expanse.—8–10 mm.

Type.—In American Museum.

Type locality.—Montclair, N. J.

Food plant.—*Eupatorium perfoliatum* (larvae in seeds and on young leaves).

12. POLYCHROSIS CARDUANA Busck

(Figs. 181, 363)

Polychrosis carduana Busck, Journ. New York Ent. Soc., vol. 15, 1907, p. 134.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6785, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 472.

Male genitalia without spine tuft from base of sacculus; spine cluster *Spc*^{2} large and heavy, arch between it and *Spc*^{1} broad and rounded; aedoeagus with short spine on upper edge near apex.

Male and female genitalia figured from reared specimens in National Collection from Decatur, Ill. ("on thistle, July 24–31," male), and Hyattsville, Md. (Busck, "Aug. 06," female paratype).

Distribution.—Maryland, New Jersey, Illinois.

Alar expanse.—9–12 mm.

Type.—In National Collection.

Type locality.—Hyattsville, Md.

Food plant.—*Cirsium* (*Carduus*) (larvae on top leaves and in flowers).

13. POLYCHROSIS BLANDULA, new species

(Fig. 368)

Resembling *yarkana* in its white hind wings, but otherwise quite different.

Palpus and face sordid ocherous fuscous shaded with black. Fore wing with a blackish basal patch; antemedian band beginning on costa as a pair of dull metallic bars separated by a line of black scales and continued on dorsum as a large white spot; median band a black bar from costa to top of cell, below this ocherous, slightly dusted at middle with blackish scales, obscure and more or less fused with the faint ocherous subtornal spot; subapical spot large, filling most of the terminal area, pale ocherous fuscous faintly margined inwardly by paler ocherous shading; dorsum finely spotted with blackish; costal spots faint, blackish to beyond middle, toward apex brownish ocherous somewhat dusted with black; a blackish apical spot and some slight dusting of black on termen below apex; cilia leaden with a blackish basal band broken with white scaling at tornus. To the naked eye the fore wing shows a blackish triangular shade on basal half extending from dorsum at basal third to outer third of costa and including the basal patch, the costal half of the antemedian and median bands and the first of the outer costal spots;

the rest of the wing, except for the strongly contrasted white spot forming the dorsal half of the antemedian band, is a rather pale ocherous fuscous. Hind wing white with a dark, smoky shade toward apex and termen; cilia white with a dark basal band.

Male genitalia with a short tuft from base of sacculus of harpe; spine clusters *Spc*[1] and *Spc*[2] strongly developed; arch between them wide; aedoeagus with a rather prominent tooth from lower surface at middle; genitalia of type figured.

Alar expanse.—15.5 mm.

Type.—In Canadian National Collection.

Type locality.—Aweme, Manitoba.

Described from unique type (N. Griddle, "9–VI–1921"). A striking form easily recognized by its large size, white hind wings, and peculiar markings.

14. POLYCHROSIS CYCLOPIANA, new species

(Figs. 185, 364)

Palpus, face, head, and thorax ashy gray. Fore wing with basal two-thirds ashy gray very faintly cross marked with fuscous scaling and with outer margin of the gray area inwardly concave; outer third whitish ocherous with a large, round, black subapical spot occupying the center of the field; this spot nowhere touching termen; from costa near apex, and lying between subapical spot and termen, two fine blackish lines running to termen; on dorsum near tornus a small triangular blackish spot; cilia ashy gray with very slight fuscous dusting. Hind wing smoky fuscous; cilia leaden fuscous with slightly darker basal band.

Male genitalia figured from paratype in Canadian Collection; female from type.

Alar expanse.—12.5–14 mm.

Type.—Cat. No. 28032, U.S.N.M.

Paratype.—In Canadian National Collection.

Type locality.—Brown's Mills, N. J.

Food plants.—Magnolia virginiana, M. glauca.

Described from female type reared July, 1920, by Harry B. Weiss from larva feeding in seed pod of Swamp Magnolia and male paratype from the Canadian National Collection labeled: "20–VII–24. Larva on imported *Magnolia glauca* Linnaeus presumably from vicinity of Philadelphia."

A striking species. In pattern like no other American *Polychrosis.*

4. AHMOSIA, new genus

(Figs. 58, 186)

Genotype.—Ahmosia galbinea, new species (North America).

Thorax with posterior tuft.

Fore wing smooth; termen straight; 12 veins, all separate; 7 to termen; 8, 9, and 10 approximate; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell at ⅔, straight.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 separate; 5 approximate to 4; termen very slightly concave below apex; male without chitinous ridge at inner margin.

Hind tibia of male with short hair pencile from base.

Male genitalia with harpe narrow, moderately elongate; outer surface unspined; cucullus narrow, tapering, strongly spined; sacculus narrow, weakly spined at base; spine cluster *Spc*[1] produced slightly from base of cucullus; spine cluster *Spc*[2] absent. Uncus strongly chitinized, stout, tapering, curved, apex bluntly pointed. Socii absent. Gnathos heavily chitinized and solidly fused with anellus. Aedoeagus long, slender, straight; cornuti absent.

Female genitalia without signum. Ductus bursae rather short, simple.

In venation (except that vein 5 of hind wing is further separated from 4 than 4 is from 3) this genus agrees with *Polychrosis*. The latter, however, has very different genitalia. I note a similar separate condition of veins 3 and 4 of hind wing in some specimens of the European *euphorbiana* Freyer and *lacunana* Duponchel; but these two have rather typical *Olethreutes* genitalia. Such discrepencies but show the instability of structure in this family and the utter impossibility of properly grouping the species upon any one set of characters.

KEY TO THE SPECIES OF AHMOSIA

1. Median dark band of fore wing broad on dorsum; alar expanse 14 mm. and over ---------- (1) galbinea.
Median dark band narrow on dorsum; alar expanse under 13 mm. (2) aspasiana.

1. AHMOSIA GALBINEA, new species

(Figs. 58, 186, 386)

Palpus whitish ocherous; second joint with two fuscous spots on outer side and a very slight fuscous shading toward apex; terminal joint pale. Face and head whitish ocherous or very pale yellow. Thorax brownish ocherous with very little paler scaling. Fore wing sordid whitish ocherous, with the usual pattern markings pale brown or ocherous fuscous somewhat dusted with blackish; basal patch reaching to costa, outwardly angulate and deeply excavate below middle; antemedian pale area broad and faintly streaked vertically with pale ocherous fuscous; merdian band broad, irregular and rather poorly defined, strongly dusted with black on costa and at middle;

subtornal spot triangular, rather pale and partially fused with median band but distinguishable; subapical bar pale fuscous, constricted at middle, swollen toward apex and base and not reaching to costa; outer costal spots rather large but faint; some faint black scaling on subapical bar and a few (3 or 4) blackish spots along termen; cilia brownish ocherous, whitish at tornus. Hind wing pale smoky fuscous; cilia whitish with dark basal band.

Male genitalia of type figured. Female genitalia figured from paratype in National Collection.

Alar expanse.—14–20 mm.

Type.—In American Museum.

Paratype.—Cat. No. 28033, U.S.N.M. Also in American Museum, Canadian National, and Barnes collections.

Type locality.—Eureka, Utah.

Described from male type, 10 male and 1 female paratypes from the type locality (May to August, Tom Spalding); 1 male and 1 female paratypes from Vineyard, Utah ("VIII–7–18" and "VII–8–12"); 3 male paratypes from Deer Creek, Provo Canyon, Utah ("VII–16–18" and "IX–11–18," Spalding); 1 male paratype from Denver, Colo. (Oslar); 2 female paratypes from Chimney Gulch, Golden, Colo. (Oslar, May); 1 female paratype from Almota, Washington (C. V. Piper); 2 male and 1 female paratypes from Jemez Springs, N. Mex. ("June 8–15"); 1 female paratype from Mesilla, N. Mex. (C. N. Ainslie); 1 male paratype from Clark County, Nev. ("June 24–30"); and 1 male paratype from Saskatoon, Saskatchewan (Kenneth M. King, "21–IX–1922").

This has been for some time in the collections as an undescribed species and part of the above series had been set aside by Kearfott under a manuscript name. The description, however, was never published. Superficially it looks like a large, rather pale *Polychrosis.*

2. AHMOSIA ASPASIANA (McDunnough)

(Figs. 184, 385)

Argyroploce aspasiana McDunnough, Can. Ent., vol. 54, 1922, p. 44.
Olethreutes aspasiana Forbes, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.

Smaller and darker than the foregoing, with smaller genitalia and somewhat slenderer uncus.

I have seen only the type material in the Canadian National Collection.

Genitalia (male and female) figured from paratypes from the type locality.

Alar expanse.—11 mm.

Type.—In Canadian National Collection.

Type locality.—Mer Bleue, Ottawa, Ontario.

5. Genus ENDOTHENIA Stephens

(Fig. 48)

Endothenia Stephens, List Brit. Animals, pt. 10, Lepid., 1852, p. 28.
Genotype.—Tortrix gentianana Hübner (Europe).
Orthotaenia Stainton (not Stephens), Man. Brit. Butterflies, and Moths, vol. 2, 1859, pp. 260, 262.
Genotype.—Tortrix antiquana Hübner (Europe).

Thorax with posterior tuft.

Fore wing smooth; termen straight or slightly convex; 12 veins; all separate; 7 to termen; 8 and 9 approximate at base; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell before ⅔, straight.

Hind wing with 8 veins; 6 and 7 stalked; 3 and 4 connate; 5 remote from 4 at base; in male with or without chitinous ridge on inner margin.

Hind tibia of male with or without hair pencile.

Male genitalia with harpe slender and broadening considerably toward base; outer surface unspined; cucullus narrow, elongate; saccullus weakly spined toward base; spine cluster *Spc*[1] upon a raised prominence projecting toward costa; spine cluster *Spc*[2] not developed. Uncus long, stout, curved; tip spatulate and strongly spined above and beneath. Socii reduced (fusing with tegumen and defined chiefly by hairy tufting); scarcely flexible; strongly haired. Gnathos absent, or represented only by a pair of weakly chitinized lateral arms branching from well back on tegumen and connecting with anellus. Aedoeagus short, stout, usually as broad as long; penis with or without cornuti, latter when present an irregular cluster of several stout, moderately long spines.

Female genitalia with single signum; latter developed as a squamous sack. Ductus bursae moderately long; chitinized only toward genital opening.

A genus easily recognized by its characteristic male genitalia. The hind wing venation (5 remote from and nearly parallel with 4) would seem to place it in the Laspeyresiinae; but the genitalia forbid this. In pattern and general habitus some of the species are strikingly similar to those of *Polychrosis*. The genitalia in some respects resemble very much those of *Bactra*, with which, however, it does not appear to have any very close connection. It is most closely related to *Taniva*, *Tia*, and *Hulda*, from which it differs chiefly in male genitalia and the remoteness of veins 5 from 4 in hind wing.

KEY TO THE SPECIES OF ENDOTHENIA

1. Fore wing with a distinctly whitish post median area ..... 2.
   Fore wing sometimes with pale post median area, but latter not white ... 4.

2. Outer margin of dark area of fore wing nearly vertical (slightly angulate outwardly at middle); extending no farther out on dorsum than on costa. (4) **melanosticta.**
   Outer margin of dark area decidedly irregular, extending farther out on dorsum than on costa ..... 3.
3. Outer costal and subapical dark markings nearly obsolete ... (1) **montanana.**
   Dark costal spots, subapical bar, and dark terminal shading distinct. (2) **rubipunctana.**
4. Dark markings of fore wing conspicuous as a blackish, more or less triangular subapical bar, a blackish subtornal spot, and a broadly triangular or hooklike black patch at end of cell reaching to costa but darkest below middle (representing remains of a median band) .. (9) **antiquana nubilana.**
   Dark markings otherwise ..... 5.
5. Ground color of fore wing pale sordid ocherous; conspicuous dark markings confined to a blackish smudge on mid costa, a black apical spot and a fine black subapical bar ..... (3) **sordulenta.**
   Ground color sometimes ocherous, but much suffused with dark scaling; conspicuous dark markings otherwise ..... 6.
6. Median and basal dark area of fore wing mottled or shaded with deep black scales; dark scaling of palpi semiiridescent bluish-black ..... 7.
   Median and basal dark areas with little or no appreciable black scaling; dark scaling of palpi fuscous ..... 8.
7. Costa of fore wing arched at middle; apex evenly rounded ... (6) **daeckeana.**
   Costa of fore wing straight beyond base; apex slightly pointed. (5) **hebesana.**
8. Antemedian area of fore wing no paler than basal area; alar expanse over 16 mm ..... (8) **infuscata.**
   Antemedian area slightly paler than basal area; alar expanse under 15 mm. (7) **conditana.**

1. ENDOTHENIA MONTANANA (Kearfott)

(Figs. 190, 349)

Olethreutes nimbatana montanana KEARFOTT, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 157.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 456.

Argyroploce nimbatana montanana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6821*a*, 1917.

Is only superficially like *nimbatana*.

Male genitalia figured from specimens in collection Cornell University from Ithaca, N. Y. (Cornell Lot no. 450, sub 434, W. T. M. Forbes). Female genitalia figured from type.

Specimens in National Collection and American Museum from New York and North Carolina.

Alar expanse.—17–20 mm.

Type.—In American Museum.

Type locality.—Mount Graybeard, N. C.

2. ENDOTHENIA RUBIPUNCTANA (Kearfott)

(Figs. 197, 356)

Olethreutes rubipunctana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 14.

Argyroploce rubipunctana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6823, 1917.

Similar to the European *gentianana* Hübner, but with uncus much narrower at apex.

Hind tibia of male without hair pencile.

Male and female genitalia figured from specimens in National Collection from Shasta Retreat, California ("June 16–23," male) and Colorado (female paratype).

Distribution.—Washington, California, Nevada, Colorado, Arizona.

Alar expense.—17–22 mm.

Type.—In American Museum.

Type locality.—Colorado.

Food plant.—Seeds of Iris.

3. ENDOTHENIA SORDULENTA, new species

(Figs. 196, 352)

Antenna with basal joint bluish black. Palpus with outer side and end of second joint and entire third joint blue black, otherwise whitish ocherous. Face whitish; overhanging scale tuft above, bluish black. Head and thorax brownish ocherous with a scattering of black scales. Fore wing pale sordid ocherous marked with brown and black; basal patch very faintly indicated by fine cross lines of brown or blackish scales; a black smudge on midcosta continuing as an irregular fine blackish line nearly to dorsum and representing the remains of the usual median bar; outer costal spots pale brown; subapical bar black, narrow, evenly curved, touching neither termen nor costa, connecting above with a straight, narrow, faint, dark band which extends to dorsum before tornus; a black spot at apex; cilia whitish ocherous somewhat spotted with bluish black toward ends. Hind wing sordid whitish shading to pale brownish fuscous toward outer margin; cilia whitish with faint dark basal band.

Hind tibia of male with yellow hair pencile from base.

Male and female genitalia figured from paratypes in National Collection from Clear Creek and Chimney Gulch, Colo.

Alar expanse.—18–22 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28034, U.S.N.M. Also in American Museum, Canadian National, and Barnes collections.

Type locality.—Denver, Colo.

Described from male type from Denver (Oslar "6–7—7"); 1 male and 1 female paratypes from Clear Creek (Oslar); 1 male and 3 female paratypes from Chimney Gulch near Golden (Oslar, July); and 1 female paratype from Berkeley (Oslar); all Colorado localities.

This series Kearfott had set aside under a manuscript name as a new species. It is possibly only a local race of *rubipuncta*.

4. ENDOTHENIA MELANOSTICTA (Walsingham)

(Figs. 191, 353)

Penthina melanosticta Walsingham, Trans. Ent. Soc. London, 1895, p. 500.
Olethreutes melanosticta Fernald, in Dyar List N. Amer. Lepid., no. 5048, 1903.
Epinotia flavillana Dyar, Proc. Ent. Soc. Washington, vol. 5, 1903, p. 230.
Argyroploce melanosticta Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6858, 1917.
Enarmonia flavillana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7165, 1917.

The largest American species in the genus. The male has a yellow hair pencile on the hind tibia, the female a dusky border along termen on underside of hind wing. In the male the underside of the hind wing is pale throughout.

Male and female genitalia figured from specimens in National Collection from Yellowstone National Park, Wyo. (male), and Williams, Ariz. (female, type of *flavillana*).

Distribution.—Colorado, Arizona, Utah, Wyoming, California.

Alar expanse.—25–30 mm.

Types.—In British Museum (*melanosticta*); National Collection (*flavillana*).

Type locatities.—Larima County, Colo. (*melanosticta*); Williams, Ariz. (*flavillana*).

5. ENDOTHENIA HEBESANA (Walker)

(Figs. 188, 350)

Sciaphila hebesana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 342.
Carpocapsa inexpertana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 394.
Penthina fullerca Riley, Amer. Ent., vol. 2, 1870, pp. 204, 371.
Penthina hebesana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 31.
Olethreutes hebesana Fernald, in Dyar List N. Amer. Lepid. no. 5038, 1903.—Kearfott, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 350; Can. Ent. vol. 37, 1905, p. 207.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.
Argyroploce hebesana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6827, 1917.

A very common species throughout the United States. Male with yellow hair pencile on hind tibia.

Male and female genitalia figured from specimens in National Collection from New Brunswick, N. J. (H. B. Weiss, Oct., 1921, male) and Norfolk, Va. (female).

Distribution.—Massachusetts, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, Florida, Texas, Ohio, Indiana, Missouri, California, British Columbia, Alberta, Manitoba, Ontario.

Alar expanse.—11–17 mm.

Types.—In British Museum (*hebesana*, *inexpertana*); National Collection (*fullerea*).

Type localities.—"North America" (*hebesana*, *inexpertana*); Missouri? (*fullerea*).

Food plants.—*Antirrhinum*, *Gerardia*, *Iris*, *Orthocarpus*, *Penstemon*, *Physostegia*, *Solidago*, *Stachys*, *Tigridia*, *Verbascum*, *Verbena* (larva feeding on seeds).

6. ENDOTHENIA DAECKEANA (Kearfott)

(Fig. 351)

Olethreutes daeckeana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 12.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.

Argyroploce daeckeana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6829, 1917.

Very similar to *hebesana*; but somewhat larger, with fore wing broader and more rounded at apex, and with slightly larger genitalia. The female genitalia is hardly different from that of *hebesana*. The male has a yellow hair pencile on the hind tibia and like *hebesana* has the underside of hind wing rough scaled along vein 1b.

Male genitalia figured from paratype in National Collection.

I have seen only specimens of the type series. Paratypes are in the American and National Museums and the Barnes collection.

Alar expanse.—17–19 mm.

Type.—In American Museum.

Type locality.—Toms River, N. J.

Food plant.—*Sarracenia purpurea* (larvae boring in stalks and flowers).

7. ENDOTHENIA CONDITANA (Walsingham)

(Fig. 354)

Penthina conditana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 31.

Olethreutes conditana FERNALD, In Dyar List N. Amer. Lepid., no. 5037, 1903.

Argyroploce conditana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6826, 1917.

There are a couple of cotypes of this species in the National Collection. Nothing else that I have seen exactly matches it. Of the specimens in the Kearfott collection under the name, two females from New Jersey and Arkansas are possibly it. They have the hind wing cilia much paler than those of the cotypes. There is also a male in the National Collection from Hessville, Indiana (A. Kwiat, "V–3—14") which may be a variety. The genitalia are very like those of *conditana*, but the pattern is more that of *infuscata*. These differences may not be significant as *conditana* is probably as variable as *antiquana*. Both *conditana* and *infuscata* are without cornuti and have the aedoeagus extended at apex into a thin chitinous tongue. Both also lack the hair pencile on male hind tibia.

Male genitalia figured from cotype.

Alar expanse.—10–12 mm.

Type.—In British Museum.

Type locality.—Mendocino County, Calif.

8. ENDOTHENIA INFUSCATA Heinrich

(Fig. 355)

Endothenia infuscata Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 109.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 459.

Closest to *conditana* Walsingham, but with termen of fore wing less slanting and with stouter genitalia. The pattern is also more like that of a suffused, brownish *antiquana*.

There are two male paratypes from Ithaca, N. Y., in the collection at Cornell University. I do not know the female. In the Canadian National Collection there are also a couple of specimens that I take to be this species. They differ somewhat in pattern, being less entirely suffused and having more black dusting on median band of fore wing; but the genitalia agree with those of *infuscata*. They may represent a distinct race but at this time I do not feel justified in naming them as such.

Male genitalia is figured from type.

Alar expanse.—17–20 mm.

Type.—In National Collection.

Type locality.— Forest Glen, Md.

9. ENDOTHENIA ANTIQUANA NUBILANA (Clemens)

(Figs. 192, 357)

Sidcrea? nubilana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 140.—Guide Study Ins. 1869, p. 333.

Sericoris vetulana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 32.

Olethreutes nubilana FERNALD, in Dyar List N. Amer. Lepid., no. 5050, 1903.—KEARFOTT, Can. Ent., vol. 37, 1905, p. 207.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 459.

Olethreutes vetulana FERNALD, in Dyar List, N. Amer. Lepid., no. 5051, 1903.

Argyroploce nubilana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6861, 1917.

Argyroploce nubilana vetulana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6861*a*. 1917.

There is only one difference between our form and the European *antiquana:* a few more short spines (8–12) on the inner side of uncus at apical margin. In the European specimens before me they number 4 to 6; but I doubt very much if the character is constant. None of our American specimens, however, show so few. For this reason I am keeping *nubilana* as a racial designation. There is no difference in female genitalia. Walsingham's *vetulana* is smaller than most western *nubilana*, but the same size as typical eastern specimens. A cotype of the former is in the National Collection. Our variety, as well as the European, shows considerable variation in color, and different American specimens from any given locality vary considerably more in size. I have seen runted specimens as small as 13 mm. expanse.

Male without hair pencile on hind tibia; penis with several (8–14) stout cornuti.

Male and female genitalia figured from specimens in National Collection from Oak Station, Pennsylvania (F. Marloff, "June 14–06," male) and Aweme, Manitoba (Criddle, female).

Distribution.—Maryland, Pennsylvania, Illinois, Iowa, Wisconsin, New Mexico, Colorado, California, British Columbia, Alberta, Manitoba, Saskatchewan, Quebec.

Alar expanse.—15–22 mm.

Types.—In Academy Natural Science (*nubilana*); In British Museum (*vetulana*).

Type localities.—Pennsylvania? (*nubilana*); northern California (*vetulana*).

Food plants.—*Stachys*, *Mentha*, *Symphytum* (In roots and lower parts of stems. European records. No American rearings).

6. TANIVA, new genus

(Figs. 50, 189)

Genotype.—*Lipoptycha albolineana* Kearfott (North America).

Characters as in *Endothenia* except:

Hind wing with vein 5 bent at base and less remote from 4; in male with a slight chitinous ridge on inner margin.

Male genitalia with harpe not markedly wider at base than elsewhere; spine cluster *Spc*[2] present as a row of fine spines upon a rigid, triangular projection from neck. Uncus reduced; bifid; apex unspined. Socii free, weak, short, flexible, drooping, finely haired. Gnathos normal; represented by a pair of lateral arms supporting the usual ribbon-like, weakly chitinized subanal plate. Aedoeagus moderately long, considerably longer than broad; cornutus a single short, weak spine.

Closely related to *Endothenia.*

TANIVA ALBOLINEANA (Kearfott)

(Figs. 50, 189, 389)

Lipoptycha albolineana Kearfott, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 160.

Argyroploce abietana Fernald, Can. Ent., vol. 40, 1908, pp. 349, 432.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6853, 1917.

Olethreutes piceae Busck, Proc. Ent. Soc. Washington, vol. 18, 1916, p. 151.

Hemimene albolineana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 7265, 1917.

Argyroploce piceae Barnes and McDunnough, Check List. Lepid. Bor. Amer., no. 6864–1, 1917.

Olethreutes abietana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.

I have compared the types of all the above, and there is no doubt of the synonymy. The species is locally important as an enemy of spruce, often doing considerable damage. The larvae eat into the leaves near their base, cut them off and web them together in a net of silk and frass.

Male and female genitalia figured from specimens in National Collection from Colorado Springs (male, reared May 24, 1915, under "Hopk. U. S. No. 13900" from *Picea engelmanni*) and Monument Park, Colo. (female, reared July 15, 1915 under "Hopk. U. S. No. 13900*b* from same food plant).

Distribution.—North Carolina, New York, Massachusetts, Maine, Minnesota, Michigan, Iowa, Colorado, British Columbia, Alberta, Manitoba, Ontario.

Alar expanse.—11–15 mm.

Types.—In American Museum (*albolineana*); National Collection (*abietana*, *piceae*).

Type localities.—Black Mountain, North Carolina (*albolineana*); Amherst, Massachusetts (*abietania*); Monument Park, Colorado, (*piceae*).

Food plants.—*Picea* and *Abies.*

7. TIA, new genus

(Figs. 53, 195)

Genotype.—Argyroploce vulgana McDunnough (North America).

Characters as in *Endothenia* except:

Hind wing with veins 6 and 7 anastomosing just beyond cell; 5 approximate to 4 at base; no chitinous thickening on inner margin in male.

Male genitalia with a squamous pad arising from membrane over basal opening of harpe; spine cluster *Spc*[1] absent; spine cluster *Spc*[2] strongly developed. Uncus slender; very slightly bent; apex pointed. Socii fusing with tegumen but very broad and defined by heavy hair tufting. Gnathos represented only by a thinly chitinized flat subanal plate attached to alimentary tube; lateral arms absent. Aedoeagus swollen at apex; penis squamous; cornuti absent.

Female genitalia with signum a single very weak scobinate patch; ductus bursae short.

Closely related to *Endothenia.*

TIA VULGANA (McDunnough)

(Figs. 53, 195, 412)

Argyroploce vulgana McDunnough, Can Ent., vol. 54, 1922, p. 46.

Paratypes of this have been deposited by Doctor McDunnough in the Barnes and National Collections.

Male and female genitalia figured from paratypes in collection Barnes from the type locality.

Alar expanse.—14–16 mm.

Type.—In Canadian National Collection.

Type locality.—Nordegg, Alberta.

Food plant.—Unknown (probably birch, according to McDunnough).

8. HULDA, new genus

(Figs. 52, 193)

Genotype.—Penthina impudens Walsingham (North America).

Characters as in *Endothenia* except:

Hind wing with vein 5 approximate to 4 at base.

Male genitalia with spine cluster *Spc*[2] on harpe strongly developed. Tegument abnormally developed, folded over beneath and hooding the anal tube. Uncus reduced to a mere vestige. Socii long, narrow, strongly chitinized and rigid; projecting at right angles from tegumen; unhaired. Gnathos a narrow, arched band arising from near base of tegumen. Aedoeagus slender, moderately long; cornuti absent.

Female genitalia with signum a weak scobinate patch.

HULDA IMPUDENS (Walsingham)

(Figs. 52, 193, 388)

Penthina impudens Walsingham, Trans. Ent. Soc. London, 1884, p. 135.
Olethreutes impudens Fernald, in Dyar List N. Amer. Lepid., no. 5073, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 456.
Argyroploce impudens Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6871, 1917.

A variable species, some specimens having the whitish areas of fore wing much more suffused with fuscous, especially toward apex, a complete dark median band and well-marked subapical bar. Between this and the typical pale form with broken median band and an almost obsolete subapical bar, the intergradations are very gradual, so no varietal lines can be drawn.

Male and female genitalia figured from specimens in National collection from Oak Station, Pennsylvania ("June 4–05," male) and Plummer Island, Maryland (Busck, May 30, 1916, female).

Distribution.—North Carolina, Virginia, Maryland, Pennsylvania, New Jersey, Massachusetts, New Hampshire, Ontario, Manitoba.

Alar expanse.—10.5–14 mm.

Type.—In British Museum.

Type locality.—North Carolina.

9. ESIA, new genus

(Figs. 56, 202)

Genotype.—Olethreutes approximana Heinrich (North America).

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins, all separate; 7 to termen; 8 and 9 closely approximate; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell at ⅔, straight.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; 5 bent at base, but rather well separated from 4; termen nowhere appreciably notched; inner margin simple in male.

Hind tibia of male without basal hair pencile.

Male genitalia with harpe moderately long, broadened beyond base, with a row of long flat spines on outer surface; cucullus stout, densely and strongly spined, apex evenly rounded; spine cluster Spc^1 strong; spine cluster Spc^2 fused with spining on outer surface; sacculus weakly spined toward base, not extended in an arch over neck. Uncus reduced, rounded, very weakly spined. Socii absent. Gnathos constricted and closely encircling alimentary tube toward extremity of tegumen, well chitinized, produced into a free chitinized blade be-

neath; subanal plate well chitinized, ribbon like, fusing with anellus. Aedoeagus moderately long, slender, curved; cornuti absent.

Female genitalia with single signum developed as an impressed scobinate patch. Ductus bursae moderately long; strongly chitinized at middle; straight.

Directly derived from *Olethreutes*. Contains, besides the American type, two European species, *charpentierana* Hübner and *spuriana* Herrich-Schaefer.

ESIA APPROXIMANA (Heinrich)

(Fig. 414)

Olethreutes approximana HEINRICH, Ins. Ins. Mens., vol. 7, 1919, p. 65.

Superficially like *Hedia cyanana* Murtfeldt; but structurally quite different.

Male and female genitalia figured from type and paratype in National Collection from the type locality (June, 1916).

Specimens in National Collection, American Museum, and New York State Collection from New York and New Jersey. There is also a female in the Canadian National Collection from Aweme, Manitoba (Norman Criddle, "27–VI–1922") labeled; "bred from *Stiranama*."

Alar expanse.—12–13 mm.

Type.—In National Collection.

Type locality.—Rensselaer, N. Y.

Food plant.—*Lythrum* ("Loosestrife," larvae rolling the terminal leaves).

10. EUMAROZIA, new genus

(Figs. 60, 194)

Genotype.—*Grapholitha* (*Poecilochroma*) *malachitana* Zeller (North America).

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins, all separate; 8 and 9 closely approximate; upper internal vein of cell from between 10–11; 3, 4 and 5 not approximate at termen; 2 from cell at ⅔, very slightly bent (almost straight).

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; 5 approximate to 4; termen slightly sinuate below apex; in male a chitinous ridge on inner margin.

Hind tibia of male without hair pencile.

Male genitalia with harpe eucosmaform; outer surface unspined; cucullus strongly spined toward neck; spine cluster *Spc*[1] a single long, strong spine; spine cluster *Spc*[2] a very small short tuft; sacculus weakly haired toward base. Uncus nearly obsolete. Socii

produced, small, hairy, flexible. Gnathos normal, a simple band with weakly chitinized subanal plate. Aedoeagus moderately long and slender, straight; cornuti absent.

Female genitalia with two signa, developed as stout triangular, thorn-like disks. Ductus bursae long, looped, chitinized throughout its length.

A monotypic North American genus.

EUMAROZIA MALACHITANA (Zeller)

(Figs. 60, 194, 413)

Grapholitha (*Poecilochroma*) *malachitana* Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 292.

Olethreutes malachitana Fernald, in Dyar List N. Amer. Lepid., no. 5044, 1903.—Walsingham, Biol. Cent. Amer. Lepid. Heter., vol. 4, 1914, p. 252.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.

Argyroploce malachitana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6854, 1917.

The well-known leaf tier on persimon. A beautiful species with olive green and rose lavender fore wings, not to be confused with anything else.

Male and female genitalia figured from reared specimens in National Collection from Falls Church, Va. (Hopk. U. S. No. 12155*k*, Aug. 2, 1914, male) and Smith Point, Tex. (F. H. B. "Bottimer No. 40," female).

Distribution.—District of Columbia, Maryland, Virginia, Ohio, Illinois, Missouri, Arkansas, Lousiana, Texas, Florida, Alabama, North Carolina.

Also recorded from Central and South America.

Alar expanse.—11.5–16 mm.

Type.—In British Museum.

Type locality.—Missouri.

Food plant.—Diospyros virginiana.

11. ZOMARIA, new genus

(Figs. 59, 199)

Genotype.—Penthina interruptolineana Fernald (North America).

Thorax with posterior tuft.

Forewing smooth; termen convex (evenly rounded); 12 veins, all separate; 8 and 9 well separated; uper internal vein of cell from between 9–10; 3, 4, and 5 not approximate at termen; 2 from cell at ⅔, slightly bent.

Hind wing with 8 veins; 6 and 7 approximately toward base; 3 and 4 connate; 5 approximate to 4; termen evenly rounded; secondary hair tuftings in male (costal tuft, or hair pencile on base of vein 1a) but no thickening at inner margin.

Hind tibia of male without basal hair pencile.

Male genitalia with harpe moderately long; outer surface unspined; cucullus finely and evenly spined, apex evenly rounded; spine cluster *Spc*[1], stout; spine cluster *Spc*[2] a long tuft upon a more or less produced digitus; sacculus arched over neck, weakly spined at base. Uncus elongate, rounded, weakly chitinized. Socii elongate, narrow, finely haired, attached along underside of uncus. Gnathos well developed, very broad; produced beneath into a free, sharp, strongly chitinized blade; subanal plate not differentiated. Aedoeagus moderately long, nearly straight; apex pointed; cornuti absent.

Female genitalia with signum a scobinate patch (in type with two ear-like projections). Ductus bursae moderately long, simple, straight.

A distinct North American genus. It genitalia characters closest to *Esia;* but in pattern and general habits more like *Eumarozia.* The three species have the same color scheme; old rose with darker purplish pattern markings, some faintly silvery scaling and more or less ocherous dusting.

KEY TO THE SPECIES OF ZOMARIA

1. Subapical bar of forewing not continued to costa; male with strong hair tuft on hind wing at base of costa, without strong hair pencile from base of vein 1*a*_____ (1) interruptolineana.
   Subapical bar continued as a curved band to midcosta; male without hair tuft on hind wing at base of costa, but with a strong yellow hair pencile from base of vein 1*a*_____ 2.
2. Dorsum of forewing strongly suffused with yellowish from base to beyond middle_____ (2) rosaochreana.
   Dorsum somewhat yellowish at base, but yellow tint abruptly terminating before middle_____ (3) andromedana.

1. ZOMARIA INTERRUPTOLINEANA (Fernald)

(Figs. 59, 199, 408)

Penthina interruptolineana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 70.

Olethreutes interruptolineana Fernald, in Dyar List N. Amer. Lepid., no. 5040, 1903.—Kearfott, Ins. New Jersey, 1910, p. 540.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.

Argyroploce interruptolineana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6849, 1917.

Male and female genitalia figured from specimens in National Collection from East River, Conn. (C. R. Ely, "No. 253," "VII–27," male), and Hampton, N. H. (S. A. Shaw, "VIII–9–1905," female).

Distribution.—New Hampshire, Connecticut, New Jersey, Maryland, District of Columbia, Ontario.

Alar expanse.—12–15 mm.
Type.—In National Collection.
Type locality.—New Hampshire.
Food plants.—*Gaylussacia*, *Vaccinium* (larva a leaf tier).

2. ZOMARIA ROSAOCHREANA (Kearfott)

(Figs. 200, 409)

Olethreutes rosaochreana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 11.
Argyroploce rosaochreana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6852, 1917.

Male and female genitalia figured from paratypes in National Collection and American Museum.

Specimens in National Collection, American Museum and collection Barnes from Florida.

Alar expanse.—11.5–12 mm.
Type.—In American Museum.
Type locality.—Florida.

3. ZOMARIA ANDROMEDANA (Barnes and McDunnough)

(Figs. 198, 410)

Olethreutes andromedana Barnes and McDunnough, Cont. Nat. Hist. Lepid. N. Amer., vol. 3, 1917, p. 223.

Very close to *rosaochreana*, but distinguished from the latter by the character given in the key and by differences in male and female genitalia. The latter are shown in the figures.

Male and female genitalia figured from paratypes in National Collection.

Specimens in National Collection, American Museum, and collection Barnes from Florida.

Alar expanse.—12–15 mm.
Type.—In collection Barnes.
Type locality.—Fort Meyers, Fla.
Food plant.—*Andromeda.*

12. Genus APHANIA Hübner

(Fig. 54)

Aphania Hübner, Verz. Schmet., 1826, p. 386.
Genotype.—*Tortrix scriptana* Hübner (Europe).
Brachytaenia Stephens, List Brit. Animals, pt. 10, Lepid., 1852, p. 25.
Genotype.—*Tortrix semifasciana* Haworth (Europe).

Thorax with posterior tuft.

Fore wing smooth; termen straight or slightly convex; 12 veins, all separate; 7 to termen; 8 and 9 well separated at base; upper

internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell at or beyond ⅔ but before ¾, straight.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; termen concave below apex but nowhere appreciably notched; in male inner margin bearing a chitinous ridge.

Hind tibia of male with strong hair pencile from base.

Male genitalia with harpe slender, elongate; outer surface unspined; cucullus broad toward apex, densely spined; neck long and slender; sacculus not extended in an arch pocketing neck; spine cluster *Spc*[1] upon a produced lobe from sacculus, strong; spine cluster *Spc*[2] not developed; sacculus weakly spined toward base. Uncus developed, simple, slightly tapering, moderately chitinized; tip weakly spined. Socii large, oval, flexible, strongly haired. Gnathos with strongly chitinized, semitubular subanal plate. Aedoeagus moderately long; slightly curved; with posterior blind sack; cornutus a single stout spine with a swollen base.

Female genitalia with two signa; latter developed as deeply impressed scobinate patches. Ductus bursae moderately long; wrinkled behind genital opening; strongly chitinized and bent (or looped) at middle.

A compact genus equally represented in Europe and North America. The genitalia, both male and female, are quite characteristic. Specific differences are slight, but apparently constant. In pattern most of our species are paralleled in Europe. Similar forms on the two continents, however, are separable on structural characters. Only one species, *capreana* Hübner, is common to both.

KEY TO THE SPECIES OF APHANIA

1. No white or whitish areas on fore wing ..... 2.
   Fore wing with one or more white or whitish areas ..... 3.
2. Fore wing with a fine black longitudinal dash on center of disk; median band obsolete, at least below middle; subapical band represented only by two fine black lines not reaching costa ..... (11) **infida** (part).
   Fore wing without black dash on disk; median band faint but complete to dorsum; apical band faint but distinguishable and reaching to costa. (12) **removana.**
3. A longitudinal white streak from extreme base through center of wing to outer pale area ..... (7) **albeolana.**
   (8) **apateticana.**
   No such longitudinal white streak from extreme base ..... 4.
4. Fore wing with a pale antemedian area extending from costa to dorsum and completely separating a dark basal patch from median dark markings ..... 5.
   Fore wing with basal two-thirds of wing very dark greyish fuscous; no antemedian pale area except occasionally a faint whitish patch on costa ..... 6.

5. Antemedian pale area broad; median dark band complete and as well defined on dorsum as on costa ..... (9) deceptana. (10) dextrana.
   Antemedian pale area narrow; median dark band more or less obsolete below cell, much stronger toward costa ..... (11) infida (part).
6. A strong ferruginous dusting along terminal margin of fore wing. (4) tertiana.
   No such ferruginous dusting along termen (terminal margin dusted with brownish fuscous) ..... 7.
7. Outer margin of basal dark area distinctly angulate ..... 8.
   Outer margin of basal dark area slanting, scarcely irregular, almost straight. (6) strigosa.
8. Fore wing broad; slightly less than 2½ times as long as broad ..... 9.
   Fore wing narrow; somewhat more than 2½ times as long as broad ..... 10.
9. Outer margin of dark basal area with a commalike white mark jutting in near center, and slightly indented near dorsum ..... (1) capreana.
   Outer margin of dark area without such white comma mark, and not indented near dorsum ..... (2) youngana.
10. Apical white area of fore wing with dark markings (except for costal dashes) very faint ..... (3) frigidana.
    Apical white area much restricted by dark fuscous markings ..... (5) afflictana.

1. APHANIA CAPREANA (Hübner)

(Figs. 265, 375)

Tortrix capreana Hübner, Samm. Eur. Schmet. Tort., 1818, fig. 250.

Antithesia capreana Wilkinson, Brit. Tort., 1859, p. 23.

Olethreutes capreana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 1864, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5033, 1903.—Kearfott, Can. Ent., vol. 37, 1905, p. 207.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.

Argyroploce capreana Kennel, Palaeark. Tort., Lfg. 3, Zoologica, vol. 21, Heft 54, 1913, p. 371.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6818, 1917.—McDunnough, Can. Ent., vol. 54, 1922, p. 41.

Argyroploce funerea Meyrick, Exot. Microlepid., vol. 2, pt. 11, 1920, p. 350.

Apotomis capreana Pierce and Metcalfe, Genitalia of Brit. Tort., 1923, p. 42, pl. 15.

Meyrick says of his *funerea* that it is probably what we have been calling *capreana* in America, but that it is quite distinct. From his description, however, it can hardly be anything else. We have two very similar species in North America, the true *capreana* and *youngana* McDunnough, distinguished by genitalia and the shape of the outer margin of the dark area of fore wing. Both have been identified as *capreana;* but most of the specimens in our collection under the name are the true *capreana.* The character that Meyrick gives for *funerea* (that is, outer edge of dark area "obtusely angulate inwardly slightly above middle and slightly indented near dorsum, otherwise hardly irregular") fits absolutely with *capreana*; for that reason I am listing his species as a synonym. Our lists also give

maestana Wocke as a synonym; but as this is purely European synonymy I am omitting the name.

Male and female genitalia figured from specimens in National Collection from Ottawa, Ontario (C. H. Young, "13—VII—1906," male), and Wellington, British Columbia (Taylor, female).

Distribution.—New Hampshire, Ontario, Saskatchewan, Manitoba, Alberta, British Columbia, Washington.

Alar expanse.—17–22 mm.

Types.—Location unknown (*capreana*); in collection Meyrick (*funerea*).

Type localities.—Europe (*capreana*); Toronto, Ontario (*funerea*).

Food plants.—*Salix*, *Populus*.

2. APHANIA YOUNGANA (McDunnough)

(Figs. 270, 374)

Argyroploce youngana McDunnough, Can. Ent., vol 54, 1822, p. 41.

Olethreutes youngana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.

In general appearance very similar to *capreana* but distinct. Readily separable on genitalia and the characters given in the key.

Male genitalia figured from type; female from specimen in National Collection from Glen House, White Mountains, N. H. ("Aug. 1–7, 1600 ft.").

Distribution.—Minnesota, New Hampshire, Maine, Ontario, Quebec.

Alar expanse.—19–22 mm.

Type.—In Canadian National Collection.

Type locality.—Meach Lake, Quebec.

3. APHANIA FRIGIDANA (Packard)

(Figs. 267, 376)

Penthina frigidana Packard, Proc. Boston Soc. Nat. Hist., vol. 11, 1867, p. 57.

Olethreutes frigidana Fernald, in Dyar List N. Amer. Lepid., no. 5030, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta. 1924, p. 454.

Penthina moeschleri Kennel, Iris, vol. 13, 1900, p. 249.

Olethreutes moeschleri Staudinger and Rebel, Cat. Lepid., vol. 2, Add., no. 1871 *ter*, 1901.

Argyroploce moeschleri Kennel, Palaeark. Tort., Lfg. 3, Zoologica, vol. 21, Heft 54, 1913, p. 377.

Argyroploce frigidana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6817, 1917.

Genitalia figures from specimens in National Collection (male) and collection Barnes (female) from Hopedale, Labrador ("July 24–31"). These specimens agree with Packard's type and Kennel's figure of *moeschleri*.

The specimen in the American Museum from Franconia, N. H., which Kearfott had under *frigidana* is not that species. It is in too poor condition to be identified with certainty; but appears to be a rather small *capreana*. Kearfott did not know *frigidana* and what he determined as such from British Columbia and elsewhere is *capreana*.[11]

There is a mutilated paratype of Packard's species in the Academy of National Science, and a cotype from the Fernald Collection in the National Museum. In the Barnes collection there is also a male that I think is this species, or a race of it, from Como, Park County, Colo. (Oslar, June).

Alar expanse.—16.5 mm.

Types.—In Museum Comparative Zoology (*frigidana*); collection Staudinger (*moeschleri.*).

Type localities.—Labrador (*frigidana* and *moeschleri*).

4. APHANIA TERTIANA (McDunnough)

(Fig. 377)

Argyroploce tertiana McDunnough, Can. Ent., vol. 54, 1922, p. 42.
Olethreutes tertiana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.

Male genitalia of type figured.

Represented as far as I know only by the type.

This species, *affícticia*, and *frigidana* Packard are very similar in appearance but show enough difference in genitalia to prevent their being lumped together. Each has a strong curved cornutus, shorter in *frigadana* than in the other two species. *A. affícticia* has a much stouter aedoeagus than either *frigidana* or *tertiana*; and both *frigidana* and *affícticia* have a broader spine cluster (*Spc*[1]) projecting from harpe than *tertiana*.

Superficially *tertiana* can be separated by the ferruginous scaling along termen and toward apex of fore wing. There seems to be no trace of it in the others. Otherwise the pattern is somewhat confusing. The outer margin of the basal dark area of fore wing is distinctly angulate on the left wing of the type; but on the right wing it is slanting and straight (as in *strigosa*).

The name should be restricted to the male type, as the female allotype is a different species (*Olethreutes buckellana* McDunnough).

Alar expanse.—16 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Canada.

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[11] See Dyar, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 927.

5. APHANIA AFFICTICIA, new species

(Fig. 378)

Palpus dark fuscous, whitish toward base and on inner side. Lower face white. Upper face, head, and thorax brownish fuscous. Basal two-thirds of fore wing brownish fuscous; outer margin of this dark area vertical from costa to middle, where it bulges out to form a blackish-brown dot on cell, and thence in a rather convex curve to dorsum before tornus; outer area bordering basal area, white; apex clouded with fuscous, this dark shade merging with an obscure subapical dark bar longitudinally streaked by three black lines; between subapical bar and outer margin of basal dark area, a broad fuscous shade extends from tornus to a point opposite cell; toward its apex this latter is marked by two fine longitudinal black lines; cilia fuscous with a white shading at tornus. Hind wing rather smoky brown; cilia whitish with a dark basal band.

Male genitalia of type figured. Aedoeagus very heavy; cornutus a stout curved moderately long spine.

Alar expanse.—17 mm.

Type.—In American Museum.

Type locality.—Mount Washington, N. H.

Described from unique male type. Closest to *tertiana* McDunnough and very like that species in pattern; but with much stouter aedoeagus and broader projecting spine cluster (*Spc*[1]) on harpe.

6. APHANIA STRIGOSA, new species

(Fig. 382)

Palpus whitish, fuscous toward apex of second joint; third joint fuscous. Face white with a transverse bar of fuscous above. Head fuscous with some whitish dusting toward front. Thorax fuscous with a few sordid white scales on tegula and tuft. Fore wing with basal two-thirds dark brownish fuscous, and outer third white much clouded with dark fuscous; outer margin of basal dark area slanting from just beyond middle of costa to dorsum near tornus with a slight projection upward from middle, otherwise scarcely irregular; on costa beyond base and before middle two obscure whitish dashes; some blackish dusting in basal dark area, most conspicuous as a short median streak toward outer margin and including the projection into white area; white area mostly suffused with dark fuscous except for a rather narrow margin bordering the basal dark area and broadening out toward costa; four dark dashes on outer half of costa; no definable subapical bar in dark terminal suffusion, but near termen just above middle two short, longitudinal,

black dashes; cilia fuscous with some white scaling at tornus. Hind wing dark smoky fuscous; cilia sordid whitish with a dark basal band.

Male genitalia of type figured. Cornutus a straight, moderately long, stout spine.

Alar expanse.—15 mm.

Type.—Cat. No. 28035, U.S.N.M.

Type locality.—Dawson, Alaska.

Described from single male received through B. Preston Clark and dated "6–16–16." In genitalia and pattern very similar to the European *sororculana* Zetterstedt but with appreciably narrower fore wings.

The male genitalia are similar to those of *dextrana* McDunnough but considerably smaller.

7. APHANIA ALBEOLANA (Zeller)

(Figs. 272, 383)

Penthina albeolana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 262.

Olethreutes hartmanniana albeolana Fernald, in Dyar List N. Amer. Lepid., no. 5035, 1903.

Olethreutes albeolana Kearfott, Can. Ent., vol. 37, 1905, p. 43; Ins. New Jersey, 1910, p. 540.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 456.

Argyroploce albeolana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6816, 1917.

In this species there is a white suffusion through center of wing fusing with the whitish apical and antemedian costal area. The dorsum is clouded with fuscous from base to near tornus; there is a small quadrate dark spot on costa near base, a larger dark patch on mid costa and a distinct black dot at end of cell.

Male genitalia figured from specimen in National Collection from Essex County Park, N. J. ("V–21–04," W. D. Kearfott); female from specimen in American Museum from Hampton, N. H. (Shaw).

Cornutus of male a stout curved spine. In the European *scriptana* Hübner (*hartmanniana*) with similar pattern, the cornutus is a long, thin, straight spine.

Distribution.—New York, New Jersey, Rhode Island, New Hampshire, Massachusetts, Maine, Nova Scotia.

Alar expanse.—17–19 mm.

Type.—In British Museum.

Type locality.—Massachusetts.

Food plant.—*Betula* (larva crumpling the leaves).

8. APHANIA APATETICANA (McDunnough)

(Figs. 269, 379)

Argyroploce deceptana McDunnough, Can. Ent., vol. 54, 1922, p. 42 (name preoccupied).
Argyroploce apateticana McDunnough, Can. Ent., vol. 54, 1922, p. 168.
Olethreutes apatcticana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.

A distinct species with the pattern of *albeolana;* but with a trifle more dark dusting and with different genitalia. The latter are similar to those of *infida* but smaller. Cornutus a single, long, stout, straight spine.

Genitalia figured from type (male) and paratype (female).

Represented by the type and two paratypes in the Canadian National Collection from Ontario and Quebec. There is also a specimen (male) from Vavenby, British Columbia in Mr. Blackmore's collection which I take to be this species or a western variety. It's genitalia are a trifle larger than those of the type, but in color and pattern it agrees very well.

Alar expanse.—15 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Canada.

9. APHANIA DECEPTANA (Kearfott)

(Figs. 268, 373)

Olethreutes deceptana Kearfott, Can. Ent., vol. 37, 1905, pp. 41, 207.
Argyroploce deceptana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6819, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.

A distinct species, somewhat variable in color. Resembles the European *inundana* Schiffermüller; but with more white dusting in antemedian and postmedian areas of fore wing.

Male and female genitalia figured from specimens in National Collection from Regina, Saskatchewan (male paratype) and Dickinson County, Minnesota (female).

Cornutus of male rather short, stout, straight.

Distribution.—Minnesota, Washington, Manitoba, Saskatchewan, Alberta.

Alar expanse.—19.5–23 mm.

Type.—In American Museum.

Type locality.—Aweme, Manitoba.

10. APHANIA DEXTRANA (McDunnough)

(Fig. 384)

Argyroploce dextrana McDunnough, Can. Ent., vol. 55, 1923, p. 165.

Represented by the type material in the Canadian Collection, one specimen (male) from London, Ontario, in the National Collection, and a doubtful male from Aweme, Manitoba, in the American Museum. The genitalia are similar to those of *albeolana* Zeller, but the cornutus is shorter. In pattern like *deceptana* Kearfott and superficially not to be distinguished from it.

Male genitalia of type figured.

Specimens in Canadian National Collection from Ontario and Alberta.

Alar expanse.—17–19 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Ontario.

11. APHANIA INFIDA, new species

(Figs. 271, 380)

A very variable species in color. Close to both *removana* Kearfott and *dextrana* McDonnough.

In all but two of the specimens there is a heavy dusting of white in antemedian and postmedian areas of fore wing; an outwardly angulate dark blackish fuscous basal patch and the costal half of a median dark band rather well contrasted, the latter a rather broad roughly triangular blotch including first outer costal dark spot; beyond it two distinct costal spots and a fine apical dash; dorsal part of median band and subtornal spot very faint, almost obsolete.

In two males from Quebec there is no white scaling and entire fore wing is a smoky fuscous with a faint ochreous tint on outer half; basal patch, median bands and costal markings obsolete except for a very faint narrow rhomboid patch on midcosta, representing the costal half of the median band.

In all the males there is a very distinct, short, median longitudinally black streak in middle of disk (cutting what would be the middle of the median band) and two fine black lines arising from a point on termen above tornus and curving upward and apart from each other in the direction of, but not reaching more than half way to costa (these correspond to the subapical bar present in many Olethreutinae); underside of fore wing semi-iridescent, smoky. Hind wing whitish somewhat smoky toward apex and termen; underside whitish; cilia whitish with dark basal band.

Male genitalia of type figured; cornutus stout, moderately long, hardly curved (in one specimen with a short spur from near base); outer angle of sacculus a sharp right angle; spined projection (*Spc*[1]) from sacculus, truncate, as broad as long and with outer edge straight. Female genitalia figured from paratype in Canadian National Collection from Aweme, Manitoba; genital opening large; ductus bursae strongly chitinized near genital opening.

Alar expanse.—18–19.5 mm.

Type and paratypes.—Cat. No. 28036, U.S.N.M. Paratypes also in Canadian National Collection, American Museum, and collections Barnes and Blackmore.

Type locality.—St. Johns, Quebec.

Described from male type and paratype from the type locality ("9–VI–15" and "12–VI–15," W. Chagnon, nos. 41 and 53); 1 male paratype from Toronto, Canada (Evans "9–VI–11"); 1 male paratype from Sebec Lake, Me. ("July 1–7"); 1 male paratype from New Hampshire (August Busck); 1 male paratype from Wisconsin (Buchholz); 1 female paratype labeled "Brandon, Aug.07,, J. F."; 1 male paratype from Calgary, Alberta ("15–VII–06," F. H. Wolley Dod); 1 male paratype from Waterton, Alberta (July 12–1923, H. L. Seamans); 1 female paratype from Aweme, Manitoba ("14–VII–1922," Norman Criddle); 10 male paratypes from Nordegg, Alberta (J. McDunnough, various June and July dates, 1921); 1 male paratype from Victoria, British Columbia (E. H. Blackmore, "no. 561," "8–VII–17"); and 1 male paratype from Franconia, N. H.

12. APHANIA REMOVANA (Kearfott)

(Figs. 266, 381)

Olethreutes removana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 15.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.

Argyroploce removana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6860, 1917.

An almost uniform slate-gray species with pattern markings very obscure and with no black dusting or markings on fore wing.

Male and female genitalia figured from specimens in National Collection from Greenwood Lake, N. J. (reared from Willow, "VII–24," male), and Hessville, Ind. (A. Kwiat, "VI–13–08," female).

Cornutus of male a rather short and thin spine, hardly curved at tip.

Distribution.—Pennsylvania, New Jersey, Indiana, Illinois, Manitoba, Ontario, Quebec.

Alar expanse.—16–19 mm.

Type.—In American Museum.

Type locality.—New Brighton, Pa.
Food plant.—*Salix.*

13. Genus SCIAPHILA Treitschke

(Figs. 17, 51)

Sciaphila Treitschke, Schmet. Eur., vol. 7, 1829, p. 233. (=*Peribrosca* Gistel).

Genotype.—(*Phalaena Tortrix wahlbomiana* Linnaeus)=*Phalaena Tortrix branderiana* Linnaeus (Europe).

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins, all separate; 7 to termen; 8 and 9 approximate; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell before ⅔, straight.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; termen evenly rounded; male without chitinous ridge at inner margin.

Hind tibia of male without hair pencile.

Male genitalia with harpe elongate, slender, broadened beyond base; outer surface spined; cucullus broadened toward apex; neck long and slender; sacculus not extended in an arch pocketing neck; spine clusters *Spc*[1] and *Spc*[2] strongly developed and closely approximate; sacculus weakly spined toward base. Uncus short, broad, lobed, rather densely spined. Tegumen narrowly elongate. Socii almost obsolete. Gnathos with prominent, moderately chitinized, spatulate, flattened subanal plate. Aedoeagus short, stout, expanding toward apex and more or less scobinate; cornuti absent.

Female genitalia with two signa; latter developed as sharp, elongate, narrow, strongly chitinized blade-like projections. Ductus bursae moderately long; simple (chitinized only toward genital opening).

A genus closely related to *Aphania.* Contains one North American species.

Pierce and Metcalfe[12] make *wahlbomiana* a synonym of *branderiana.* Under the former name European authors have hitherto identified quite a different species. In consequence of which *Sciaphila* has been sunk to *Cnephasia.* It seems strange that all should have made such a mistake; and I am still somewhat sceptical about the correctness of the new synonymy. However, as Pierce and Metcalfe state that they have compared the Linnaean types there is nothing to do but to follow them and remove Treitschke's generic name from the Tortricidae and apply it here.

[12] Genitalia Brit. Tort., 1922, pp. 15, 48.

SCIAPHILA DUPLEX (Walsingham)

(Figs. 17, 51, 257, 387)

Penthina duplex WALSINGHAM, Proc. Ent. Soc. London, 1905, p. 501.

Olethreutes duplex FERNALD, in Dyar List N. Amer. Lepid., no. 5049, 1903.—DYAR, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 925.—KEARFOTT, Can. Ent., vol. 37, 1905, p. 207.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 456.

Argyroploce duplex BARNES and MCDUNNOUGH, Check List. Lepid. Bor. Amer., no. 6859, 1917.—BLACKMORE, Rep. Prov. Mus. Nat. Hist. British Columbia, 1921, p. M–33.

Argyroploce thallasana MCDUNNOUGH, Can. Ent., vol. 54, 1922, p. 43.

The American form is probably only a race of the European *branderiana* Linnaeus. Our specimens, however, usually have the antemedian and postmedian areas of fore wing distinctly white. There are also slight genitalia differences. In *duplex* the cucullus is narrower toward apex, more weakly spined along the lower margin and the aedoeagus is more strongly scobinate. From the differences shown in genitalia among European specimens it would seem that there are two very distinct varieties under the one name in Europe. In order to avoid any possible confusion, I am for the present keeping *duplex* as a separate species. Both it and *branderiana* are variable in pattern. Both have the same food plant and like female genitalia.

McDunnough's *thallasana* is only a dark suffused form of *duplex*.

Male and female genitalia figured from specimens in National Collection from Kaslo, British Columbia (H. G. Dyar, "No. 19140, on Aspen," male) and Scranton, Pa. (E. A. Lister, "VI–4–1905," female).

Distribution.—Pennsylvania, New York, New Hampshire, Vermont, Wisconsin, Colorado, Utah, Nevada, California, British Columbia, Alberta, Manitoba, and Ontario.

Alar expanse.—21–27 mm.

Types.—In British Museum (*duplex*); Canadian National Collection (*thallasana*).

Type localities.—Loveland, Colo. (*duplex*); Aweme, Manitoba (*thallasana*).

Food plant.—*Populus tremuloides.*

14. BADEBECIA, new genus

(Figs. 43, 256)

Genotype.—*Tortrix urticana* Hübner (Europe and North America).

Characters as in *Aphania* except:

Forewing with vein 2 from cell before ⅔.

Male genitalia with uncus much reduced, narrow, pointed. Gnathos a strongly chitinized pointed arch, scobinate (set with long spines) beneath and supporting a very thinly chitinized, flattened subanal plate. Aedoeagus produced at apex into a long, narrow introvertable chitinized ribbon bearing at its apex a short stout spine.

Female genitalia with signum a single, weak scobinate patch. Ductus bursae swollen and strongly chitinized for over one-third its length from genital opening.

A monotypic genus closely related to *Aphania*.

BADEBECIA URTICANA (Hübner)

(Figs. 43, 256, 391)

Tortrix urticana Hübner, Schmet. Eur. Tort., 1800, fig. 65.

Sericoris campestrana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 282.

Olethreutes urticana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 1921, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5061, 1903.

Olethreutes campestrana Fernald, in Dyar List N. Amer. Lepid., no. 5066, 1903.—Dyar, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 924.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

Argyroploce utricana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6842, 1917.—Pierce and Metcalfe, Genitalia Brit. Tort., 1922, p. 49, pl. 16.

Argyroploce campestrana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6864, 1917.

The name *urticana* Hübner has b en a long time in our lists; but most of the specimens that have been referred to it are anything but that species. What Kearfott and others usually had so named was *Olethreutes deprecatoria* Heinrich. The true *urticana* was confused with *puncticostana*, *glaciana* (*dealbana*), and *cespitana* (*instrutana*) and when correctly determined only appeared under *campestrana* Zeller. Strange to say the synonymy of the latter was not suspected. The European series that I have seen were also mixed indiscriminat ly with *umbrosana* Freyer. The confusion is excusable; because the different species are all variable and at the same time very similar in superficial appearance. They can only be properly separated by the genitalia which fortunately are distinctive for each of them.

Male and female figured from specimens in National Collection from Clear Creek, Colo. (male), and Europe (female).

Distribution.—Massachusetts, Maine, New Hampshire, Wisconsin, North Dakota, Colorado, Arizona, Montana, Oregon, Washington, British Columbia, Alberta, Manitoba, Ontario, Quebec.

Alar expanse.—15–19 mm.

Types.—Location unknown (*urticana*); In Museum Comparative Zoology (*campestrana*).

Type localities.—Europe (*urticana*); "Maine or Massachusetts" (*campestrana*).

Food plants.—*Rubus nutkanus* (Dyar record), sugar beet, cranberry, "rum cherry" (larvae feeding upon the larves: U. S. Bur. Ent. records), *Betula*, *Populus tremuloides*.

15. Genus PHAECASIOPHORA Grote

(Figs. 16, 61, 233)

Phaecasiophora Grote, Bull. Buffalo Soc. Nat. Sci., vol. 1, 1873, p. 90.

Genotype.—(*Scricoris mutabilana Clemens*)=*Sciaphila confixana* Walker (North America).

Thorax with posterior tuft.

Forewing smooth; termen convex; 12 veins, all separate; 7 to termen; 8 and 9 approximate; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell at ⅔, very slightly bent.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; termen nowhere notched; in male with chitinous ridge on inner margin.

Hind tibia of male heavily tufted with scales (less so in *niveiguttana*) and with strong yellow hair pencile from base.

Male genitalia with harpe elongate, broadened beyond base; outer surface unspined; cucullus long and narrow, evenly spined throughout, apex bluntly pointed; sacculus simple, weakly spined toward base; spine clusters *Spc*[1] and *Spc*[2] not developed. Uncus absent. Socii large, oval-triangular, flexible, finely haired. Gnathos a simple, weakly chitinized band, without subanal plate. Aedoeagus short, stout, straight; cornuti a cluster of long, slender, deciduous spines.

Female genitalia without signum. Ductus bursae moderately long, chitinized for part of its length, toward genital opening.

Directly derived from *Olethreutes*. Contains two North American species. The male character upon which the genus was originally established (broadly tufted hind tibia) is decidedly less obvious in *niveiguttana* than the type; but is present in both species.

KEY TO THE SPECIES OF PHAECASIOPHORA

1. Median band of fore wing not extending to dorsum; subapical bar very broad; black dusting on disk rather in horizontal streaks than otherwise. (1) confixana.

   Median band extending to dorsum; subapical bar narrow; black scaling in vertical streaks or outlining the dark pattern markings__ (2) niveiguttana.

1. PHAECASIOPHORA CONFIXANA (Walker)

(Figs. 16, 61, 233, 394)

Sciaphila confixana WALKER, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 340.

Sciaphila? perductana WALKER, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 341.

Sericoris mutabilana CLEMENS, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 135.

Phaecasiophora mutabilana GROTE, Bull. Buffalo Soc. Nat. Sci., vol. 1, 1873, p. 90.

Phaccasiophora confixana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 36.—FERNALD, in Dyar List N. Amer. Lepid., no. 5077. 1903.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6877, 1917.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 459.

This and the following (*niveiguttana*) are very similar in pattern and appearance. Each has a white dot in cell on outer margin of median band, the median band excavate behind, and the subapical bar sending a spur from middle to termen. Their genitalia are very similar. Those of *confixana* (male) have the harpes slightly the broader.

Male and female genitalia figured from specimens in National Collection from Plummer Island, Md., and Falls Church, Va. (August Busck, May).

Distribution.—New Hampshire, New Jersey, Pennsylvania, Maryland, Virginia, District of Columbia, Texas.

Alar expanse.—17–20 mm.

Types.—In British Museum (*confixana*, *perductana*): Academy Natural Science (*mutabilana*).

Type localities.—"North America" (*confixana perductana*); Virginia (*mutabilana*).

2. PHAECASIOPHORA NIVEIGUTTANA Grote

(Figs. 231, 395)

Phaecasiophora ? *niveiguttana* GROTE, Bull. Buffalo Soc. Nat. Sci., vol. 1, 1873, p. 91.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 459.

Olethreutes niveiguttana FERNALD, in Dyar List N. Amer. Lepid., no. 5075, 1903.—KEARFOTT, Ins. New Jersey, 1910, p. 539.

Argyroploce niveiguttana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6873, 1917.

This species has the hind tibia of the male much less tufted with scales than *confixana* and for this reason had been removed from *Phaecasiophora* where Grote originally placed it. The genitalia

show, however, that it must go there. It also has the secondary character, though not so prominently as *confixana*. The two species are very close.

Male and female genitalia figured from specimens in National Collection from Plummer Island, Md. (Busck, July, male), and Washington, D. C. (Busck, July, female, reared from *Sassafrass*).

Distribution.—Massachusetts, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, District of Columbia, North Carolina, Florida, Arkansas, Missouri, Illinois.

Alar expanse.—14–17 mm.

Type.—In National Collection.

Type locality.—Pennsylvania.

Food plants.—*Sassafras* (also *Hamamelis* according to Kearfott).

16. Genus EXARTEMA Clemens

(Figs. 11, 14, 18, 42, 204)

Exartema Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 356.
Genotype.—*Exartema nitidana* Clemens (North America.)

Thorax with posterior tuft.

Fore wing smooth; termen convex; 12 veins; all separate; 7 to termen; 8 and 9 approximate at base; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell at or beyond ⅔ but before ¾, straight or very slightly bent.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; 5 approximate to 4 at base; in male with termen more or less notched at veins 5, 1*c* and 1*b* and with inner margin developed into an extended lobe (fig. 18).

Hind tibia of male with long hair pencile from base.

Male genitalia with harpe elongate and with a row of flat, thin, hair-like spines along outer surface; cucullus elongate, narrow, densely spined; a cluster of extra heavy spines at base of cucullus (*Spc*[1]); sacculus extended in an arch over and pocketing neck; spine cluster (*Spc*[2]) always present and frequently upon a finger-like process (digitus) projecting from the neck; spines at base of sacculus short and weak. Uncus developed; weakly chitinized; tip weakly spined. Socii developed; oval; broad; hairy and flexible. Gnathos normal, a simple band with weakly chitinized subanal plate. Aedoeagus short or only moderately long; straight or very slightly curved; cornuti normally absent, sometimes one, two, or three short rather weak ones present.

Female genitalia with signum present or absent; if present a single small, weak, scobinate patch. Doctus bursae moderately long; unchitinized except near genital opening.

A compact genus represented outside of North America as far as I know only by a few Asiatic species. It derives directly from *Olethreutes*. The chief character separating it from that genus is the strongly developed basal lobe on the hind wing of the male. This is a prolongation and folding over of the membranous area of the wing back of vein 1*a*, including within the fold a chitinous ridge morphologically homologous with that upon the inner margin of the male hind wing in *Olethreutes* and several other Olethreutine genera. The mere presence or absence of such a lobe (it is a secondary character that has been separately acquired in at least three other genera) would not be a sufficient character for either separating or bringing together species in generic grouping, did other facts not justify such a proceedure. As it is, the character seems to be a good one; that is, for separating species with such a lobe from those without it, not, however, for grouping together all species having it.

Loxoterma, *Cymolomia*, and *Eccopsis* each has a lobe similar to that of *Exartema;* but each is a good genus. On genitalia *Loxoterma* Busck (type, *Tortrix latifasciana* Haworth, fig. 390), might go very well with *Exartema*. It differs strikingly, however, in venation (having veins 3–4 of hind wing separate). *Cymolomia* Lederer (type, *Sciaphila hartigiana* Ratzeburg) also differs in venation, having 3–4 of hind wing stalked, a character which would place it outside the subfamily did not genitalia and habitus show it to be a true Olethreutine. Its genitalia are quite different from those of *Exartema* (see fig. 396). *Eccopsis* Zeller (type, *Eccopsis wahlbergiana* Zeller) is at once differentiated by the much produced and strongly chitinized socii of its genitalia (figs. 57, 397) and the branching of the upper internal vein of cell of fore wing from between 9 and 10. I have noticed what appears to be a tendency to this latter development in one species of *Exartema* (*monetiferanum* Riley, see p. 135); but here I think the occasional branching of the internal vein from between 9–10 is a mere freak occuring in very few specimens. I have never noticed it in any other species of *Exartema;* and wherever else it occurs it seems to be a consistent character of real generic value.

I am holding the genus *Exartema* because I believe it represents a natural group. All the species with the exception of a few have strikingly similar male genitalia of a peculiar type. The exceptional species (those of Group *C*) correspond in genitalia rather closely with certain species of *Olethreutes* and probably represent the base of the *Exartema* line where it branches from the main *Olethreutes* stem. There is nothing to indicate that the group had other than a single point of origin, or that its developmental tendency is in more than one direction from that point. General habitus shows the several species to be closer to each other than to any Olethreutinae

without the lobe. As far as identification goes there is little difficulty. There is no such uncertainty about the lobe as there often is, for example, about the costal fold in other groups. It is either present and fully developed or absent (that is, the elongated, folded structure, not the mere chitinized ridge at inner angle).[13] Specifically the group presents more difficulty. Many of the species are so variable in color and, differ so slightly in structure (especially those of Group *B*) that it is a hard problem to define their specific limits. To add to the difficulty most of them have a number of food plants, and many have common hosts. The trouble probably is that we are recognizing too few or too many species. If the former is the case then we are allowing too slight a range for structural variation. Careful and extensive rearings from known parents will have to be made before we can be really sure of our species.

The larvae as far as known are all leaf tiers, webbing together the terminal leaves into a rather compact tie and feeding upon the enclosed leaves and buds. Some of the species, especially those attacking the berry-bearing plants (strawberry, raspberry, etc.), are of economic importance as enemies of cultivated plants; but none has ever been recorded as an especially serious pest.

For convenience of identification I have divided the genus into three groups according to the arrangement of spine group, *Spc*^{2}, on the harpe of the male genitalia, as follows:

Group *A*.—Spine group, *Spc*^{2}, upon a digitus projecting from neck of harpe near sacculus.

Group *B*.—Spine group, *Spc*^{2}, upon a digitus projecting from neck of harpe near cucullus.

Group *C*.—Spine group, *Spc*^{2}, not upon projecting digitus.

The chief structural differences between close species are in the strength, number, and grouping of the spines of spine groups *Spc*^{1} and *X* on the harpes of the males and in the shape and chitinous development of the genital plates of the females. These differences are often slight. There is, however, little or no asymmetry in any given species and the characters seem to be good. I do not attach any great importance to the presence or absence of the signum. When present it is very weak, often nothing but a vestigial patch which might easily disappear within the limits of any given species.

As photographs of male genitalia show very little in this group, only a few, representing markedly different forms, are given here. A caution is also necessary in connection with the drawings of the harpes (pls. 14, 15, 16, 17, 18). These are accurate as far as struc-

[13] The one possible exception (*Olethreutes arcuella*) to the contrary notwithstanding. Walsingham states (Ann. Mag. Nat. Hist., ser 7, vol. 6, 1900, p. 128) that Japanese and Korean species possess a short lobe, lacking in European examples.

tures are concerned and they show the characters—such as they are—separating the various species; but they were not made to any uniform scale and the differences in size are not significant.

KEY TO THE SPECIES OF EXARTEMA

1. Dark pattern markings of fore wing much broken by rather large spots of the pale ground color, giving wing a mottled appearance. (1) **monetiferanum.**
   Fore wing otherwise ..... 2.
2. Fore wing ashy-gray-white with a red-brown basal patch and a large red-brown quadrate spot upon midcosta, the latter fusing with subapical bar. (48) **ferriferanum.**
   Fore wing otherwise ..... 3.
3. Hind wing markedly whitish toward base ..... 4.
   Hind wing uniformly dark or pale smoky fuscous; at most only faintly whitish toward base ..... 5.
4. Fore wing cinnamon-brown ..... (19) **bicoloranum.** (39) **submissanum.**
   Fore wing blackish fuscous ..... (20) **tenebricum.**
5. Fore wing with median vertical band more or less obliterated by a central longitudinal pale suffusion; or with a blackish suffusion covering basal four-fifths of wing ..... 6.
   Fore wing with median vertical band defined; usually well contrasted against both antemedian and postmedian paler areas; if sometimes poorly defined upon inner margin due to dark dusting in antemedian area, always at least somewhat contrasted against postmedian pale markings ..... 18.
6. Fore wing with a blackish suffusion covering basal four-fifths; outer fifth whitish, whitish ocherous or ocherous, except for blackish subapical bar. (44) **concinnanum terminanum.**
   Fore wing not so marked ..... 7.
7. Fore wing snowy white somewhat spotted and dusted with black or blackish fuscous toward lower inner angle, on outer half of costa, and toward termen and apex ..... (41) **malanum.**
   Fore wing more or less marked with dark patches and sometimes with considerable suffusion of whitish ocherous on disk; but never with pale areas snowy white ..... 8.
8. Fore wing with a purplish fuscous or dark grayish fuscous blotch (consisting of a fusion of basal patch, dorsal portion of median band and, often, subtornal spot) covering most of dorsum nearly to tornus ..... 9.
   Fore wing more or less dark shaded or spotted; but never with a strongly contrasted dark blotch continuous from base and reaching beyond middle of dorsum ..... 10.
9. Dark patch on dorsum of fore wing extending to but not including subtornal spot or (where latter is absent) the area usually occupied by same; male genitalia with spined digitus projecting from neck of harpe near sacculus. (16) **clavanum.**
   Dark patch on dorsum extending to tornus, including subtornal spot; male genitalia with spined digitus projecting from neck of harpe near cucullus. (25) **nigranum** (part).
10. Subapical bar and preternal spot of fore wing both obsolete ..... 11.
    One or both of the above marks always present and definitely outlined, though sometimes faintly colored ..... 12.

11. Fore wing olivaceous drab with a strong dark brownish fuscous bar or patch at lower inner angle, a small dark brown dot at end of cell and a whitish ocherous shade extending from base of costa longitudinally through cell and suffusing preterminal area ..... (14) **cornanum.**

Fore wing suffused olivaceous gray with a very faint black shade extending diagonally from dorsum just beyond base to midcosta, and with a conspicuous black spot at apex; no whitish median shading and no dark mark at end of cell ..... (18) **exoletum.**

12. Fore wing with basal patch, a midcostal spot, subapical bar and pretornal spot concolorous and either raw sienna yellow or soudan brown. (29) **ochrosuffusanum.**

Above markings not concolorous; or if so, blackish or olivaceous fuscous, never sienna yellow or soudan brown ..... 13.

13. Subapical bar of fore wing strongly shaded with black toward costal extremity; appreciably darker than dark markings near base of wing; pale terminal area of wing tinted with ferruginous ..... (27) **merrickanum.**

Subapical bar not shaded with black toward extremity; no darker than dark markings at base of wing, often paler; cilia of fore wing sometimes ferruginous but otherwise no appreciably ferruginous shading in terminal area ..... 14.

14. Cilia of fore wing strongly ferruginous ..... (28) **corylanum.**

Cilia of fore wing not ferruginous except perhaps very slightly so at tornus ..... 15.

15. Fore wing with a fine line of white scaling following the fold, and similar fine white streaks outlining veins 1*b*, 1*c*, 2, 3, and 4; male genitalia with spined digitus projecting from neck of harpe near cucullus. (21) **quadrifidum.**

Fore wing with considerable white or whitish scaling; but more diffused and not outlining veins as above; male genitalia with digitus projecting from neck of harpe near sacculus ..... 16.

16. Thorax and lower inner angle of fore wing strongly dusted with ferruginous or brown-red scales ..... (15) **inornatanum.**

Thorax and fore wing not so dusted ..... 17.

17. Costa of fore wing at base shining white; basal patch heavily shaded with black, the blackish scaling extended diagonally to middle of costa; dark markings upon dorsum beyond basal patch, distinctly olivaceous. (13) **punctanum.**

Costa of fore wing at base whitish ocherous; basal patch concolorous with other dark markings of wing, ocherous drab; a large ocherous drab spot on dorsum beyond basal patch ..... (17) **mediopartitum.**

18. Median band of fore wing with two well defined, outwardly projecting teeth, upper below costa and lower from middle of band; antemedian and postmedian pale areas sometimes whitish but never both decidedly white ..... 19.

Median band with no such well defined teeth; if sometimes weakly indicated, then antemedian and postmedian pale areas both decidedly white ..... 43.

19. A fine, short, longitudinal whitish line cutting the median band above lower tooth ..... 20.

No such whitish line cutting median band; when latter is broken it is by invading extensions of the post median pale area ..... 21.

20. Dark pattern markings of fore wing brussels brown; pale areas dull leaden metallic ---------- (23) **sciotanum.**
Dark pattern markings velvety black-brown; pale areas with a decided rosy tint ---------- (24) **trepidulum.**
21. General color of fore wing (both pale and dark areas) markedly yellow ---------- 22.
General color otherwise ---------- 23.
22. Dark markings of fore wing ocherous-orange; pale areas yellow, faintly suffused with pinkish; male genitalia with spined digitus projecting from neck of harpe near sacculus ---------- (2) **nitidanum.**
Dark markings of fore wing cadmium yellow; pale areas paler yellow without pinkish suffusion; male genitalia with spined digitus projecting from neck of harpe near cucullus ---------- (31) **ferrugineanum.**
23. Median band of fore wing with both teeth long (three or more than three times as long as wide); invading extension of postmedian pale area between the teeth, deep and wedge shaped, deeper than distance separating the teeth; alar expanse always over 15 mm ---------- 24.
Never will all above characters. Teeth of median band normally short or only miderately long; sometimes lower long and upper correspondingly short; where teeth are inclined to be long the space between them is more round or oval than wedge shaped and equal to or greater than the depth of the invading area separating them; alar expanse either over or under 15 mm.; when both teeth are long expanse always less than 15 mm ---------- 26.
24. Pattern markings of fore wing brussels brown to dark brownish fuscous. (25) **nigranum** (part).
Pattern markings of fore wing paler, more olivaceous (ocherous tawney or tawney-olive) ---------- 25.
Pattern markings of fore wing pale rust red shading to olivaceous on middorsum and toward base ---------- (32) **fagigemmeanum** (part).
25. Thorax ocherous-tawney with little pale dusting except upon anterior half of tegula ---------- (22) **tilianum** (47) **exaeresimum.**
Thorax pale or whitish ocherous faintly cross barred with dark fuscous. (32) **fagigemmeanum** (part).
26. Median band of fore wing much darker toward costa than toward dorsum ---------- 27.
Median band uniformly colored or but very little darker toward costa ---------- 30.
27. Dark dusting of median band confined to a small quadrate blackish fuscous patch on costa ---------- (43) **concinnanum.**
Dark dusting diffused over upper half of median band ---------- 28.
28. Dark part of medium band dark brown; pale areas of fore wing somewhat ferruginous or purplish ocherous ---------- 29.
Dark part of median band blackish fuscous; pale areas of fore wing whitish ocherous ---------- (12) **atrodentanum.**
29. Lower tooth of median band same length as upper, well separated from subapical bar; male genitalia with spined digitus projecting from neck of harpe near sacculus ---------- (11) **footianum.**
Lower tooth of median band longer than upper, connecting with subapical band; male genitalia with spined digitus projecting from neck of harpe near cucullus ---------- (34) **melanomesum.**

30. Basal patch of fore wing triparted (longitudinally divided into three patches) ---- 31.
Basal patch sometimes interrupted below costa, or blotted out upon costal margin by pale shading, or vertically striated; but never longitudinally triparted ---- 32.
31. Dark pattern markings of fore wing brown; alar expanse 20 mm. or over. (26) **hippocastanum.**
Dark pattern markings olivaceous; alar expanse under 17 mm. (3) **foedanum.** (4) **furfuranum.**
32. Alar expanse 14 mm. or less ---- 33.
Alar expanse 15 mm. or over ---- 35.
33. Dark areas of fore wing tawney ferruginous ---- (40) **nananum.**
Dark areas of fore wing ocherous-fuscous ---- 34.
34. Thorax faintly and narrowly lined with fuscous, anterior margin ocherous. (5) **olivaceanum.**
Thorax narrowly lined with ocherous, anterior margin fuscous. (46) **troglodanum.**
35. Dark markings of fore wing olivaceous or ocherous-fuscous; pale markings whitish-ocherous, more or less lined with fuscous, but with no purplish, ferrugineous, or pinkish suffusion; teeth of median band long and widely spaced apart ---- (38) **permundanum.**
Color pattern otherwise; if as above, then teeth of median band short and narrowly spaced ---- 36.
36. General color of fore wing strongly ferruginous ---- 37.
General color of fore wing not markedly ferruginous ---- 38.
37. Underside of hind wing paler than underside of fore wing; male genitalia with spined digitus projecting from neck of harpe near sacculus. (10) **zellerianum.**
Underside of fore and hind wings concolorous; male genitalia with spined digitus projecting from neck of harpe near cucullus. (33) **sericoranum** (part).
38. Ante and post median pale areas of fare wing dark leaden purple; cilia of hind wing fuscous ---- (30) **brunneopurpuratum.**
Ante and post median areas sometimes faintly purplish, but never dark leaden purple; cilia of hind wing whitish ---- 39.
39. Fore wing with central vertical dark line of antemedian pale area strongly marked and with well-defined lines of fuscous scales in postmedian pale area ---- (9) **rusticanum.**
All such lines rather weak and more or less discontinuous ---- 40.
40. Antemedian pale area of fore wing markedly whitish, in some specimens with a faint pinkish suffusion; when the latter, then basal patch, median band and subapical bar rather strongly dusted with black ---- 41.
Antemedian pale area very pale sordid ocherous-fuscous or leaden metallic with ocherous or pinkish suffusion; when pinkish, no pronounced black shading on dark pattern areas ---- 42.
41. Teeth of median band narrowly separated by a small triangular extension of the pale postmedian area; male genitalia with spined digitus projecting from neck of harpe near sacculus ---- (8) **electrofuscum.**
Teeth of median band more broadly saparated by a roundish extension of the pale postmedian area; male genitalia with spined digitus projecting from neck of harpe near cucullus ---- (37) **brevirostratum.**

42. Dark pattern markings of fore wing brussels brown; male genitalia with spined digitus projecting from neck of harpe near sacculus. (7) subnubilum.
Dark pattern markings of various brownish shades, but never brussels brown; male genitalia with spined digitus projecting from neck of harpe near cucullus ---------- (33) sericoranum (part).
43. Fore wing with an appreciable shading of rusty yellow on outer half, especially toward termen ---------- (45) fasciatanum.
No such yellowish shading on fore wing ---------- 44.
44. Median band of fore wing broken below costa and above dorsum; forming three irregular dark spots ---------- (6) fraternanum.
Median band complete ---------- 45.
45. Dark pattern markings of fore wing brown; antemedian and postmedian pale areas clear white ---------- 46.
Dark pattern markings dark grayish fuscous; antemedian and postmedian pale areas rather sordid white ---------- (42) appendiceum.
46. Costa of fore wing at base white ---------- (36) versicoloranum.
Costa of fore wing at base dark brownish fuscous ---------- (35) valdanum.

GROUP A.—GENITALIA OF MALE WITH A SPINED DIGITUS (*Spc*^{2}) PROJECTING FROM NECK OF HARPE CLOSE TO SACCULUS

1. EXARTEMA MONETIFERANUM Riley

(Figs. 70, 221)

Exartema monetiferanum RILEY, Trans. St. Louis Acad. Sci., vol. 4, 1881, p. 317.—FERNALD, in Dyar List N. Amer. Lepid., no. 5012, 1903.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6795, 1917.

Cymolomia monetiferana FORBES, Memoir 68, Cornell Univ. Exp. Sta., 1924, p. 463.

The species may be at once distinguished by the character given in the key. The upper internal vein of cell in fore wing is somewhat variable. In most specimens it is normal (that is from between veins 10 and 11). In some, however, it comes from between 9 and 10, and in a few is entirely lost. It is interesting to note that when there is a variation from the normal in this respect it is not the same in both right and left fore wings of any particular specimen.

Harpe of male genitalia figured from type; female from specimen in National Collection from New Brighton, Pa. (H. D. Merrick, "VI–8–04").

Bursa of female without signum.

Distribution.—Alabama, Pennsylvania, Ohio.

Alar expanse.—16–21 mm.

Type.—In National Collection.

Type locality.—Eufaula, Ala.

2. EXARTEMA NITIDANUM Clemens

(Figs. 42, 64, 204, 399)

Exartema nitidana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 356.

Sericoris nitidana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 133.

Exartema nitidanum Fernald, in Dyar List N. Amer. Lepid., no. 5010, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6793, 1917.

Cymolomia nitidana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 468.

Clemens' description of this species is misleading. He speaks of the fore wings as reddish brown with "markings pure brown." The type at Philadelphia, corresponding with what we have in the collection as *nitidanum*, has the pale areas of the fore wing yellow with an overshading of faint rose color and the dark markings brownish yelllow. The general color of the insect is decidedly more yellow than brown.

Male genitalia figured from specimen in National Collection from Vermont; female from specimen in American Museum from Cincinnati, Ohio.

Bursa of female without signum.

Distribution.—Ohio, Pennsylvania, Vermont, Ontario.

Alar expanse.—15–20 mm.

Type.—In Academy Natural Science, Philadelphia.

Type locality.—Pennsylvania.

3. EXARTEMA FOEDANUM (Clemens)

(Figs. 65, 209)

Sericoris foedana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 135.

Exartema concinnanum Fernald, in Dyar List N. Amer. Lepid., no. 5017, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6800, 1917.

Cymolomia foedana Fobbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

This species has been incorrectly listed as a synonym of *concinnanum* Clemens. It resembles the latter somewhat in pattern but is quite different in genitalic structure. Strangely enough specimens of the true *foedanum* have always been mixed with *olivaceanum* Fernald in our collections.

Harpe of male genitalia figured from specimen in National Collection from Ocean View, Va.; female from a reared specimen without locality label ("July 27, 93"), also from the National Collection.

Bursa of female without signum.
Alar expanse.—11–14 mm.
Type.—In Academy Natural Sciences, Philadelphia.
Type locality.—Virginia.
Food plant.—Blackberry.

4. EXARTEMA FURFURANUM McDunnough

(Fig. 78)

Exartema furfuranum McDunnough, Can Ent., vol. 54, 1922, p. 38.
Cymolomia furfurana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

Very close to *foedanum* and probably only a larger form of that species. I am keeping it separate for the present as the genitalia are considerably larger than those of typical *foedanum.*

So far represented only by the type and paratype from Ottawa and Quebec in the Canadian National Collection.

Harpe of male genitalia figured from type.
Alar expanse.—16 mm.
Type.—Canadian National Collection.
Type locality.—Ottawa, Ontario.

5. EXARTEMA OLIVACEANUM (Fernald)

(Figs. 66, 211, 400)

Eccopsis olivaceana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 71.
Exartema olivaceanum Fernald, in Dyar List N. Amer. Lepid., no. 5016, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6799, 1917.
Exartema bolandanum McDunnough, Can. Ent., vol. 54, 1922, p. 39.
Cymolomia olivaceana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

This species has been badly mixed in the collections. Over half the specimens so named were either *troglodanum* or *foedanum.* In general appearance, pattern, and color the three are very similar. Clemens' *foedanum* can be separated by the broken basal patch of fore wing; but *olivaceanum* and *troglodanum* are so much alike that they can be definitely determined only by their genitalia. The pattern characters given in the key hold in the main and will help to separate most specimens; but they break down in some, especially the darker examples of *troglodanum*, and when the thorax is rubbed can not be used at all. Fernald had no idea that there were two species involved, for he frequently determined specimens of *troglodanum* as *olivaceanum.* Of the so-called "homotypes" in the Kearfott Collection, one is *troglodanum* and the other *olivaceanum.*

McDunnough's *bolandanum* is a straight synonym. It was distinguished by the thickness of the subapical bar of fore wing and its relative nearness to apex, characters that are extremely variable and not to be relied upon. There are no genitalia differences between it and typical *olivaceanum*.

Genitalia figured from specimens in National Collection from Buffalo, New York (William Wild, "VII–15–09," male) and Ottawa, Canada (C. H. Young, "28–VI–1905," female). Bursa of female without signum.

Distribution.—New Jersey, Pennsylvania, New York, Massachusetts, Maine, Ontario, British Columbia.

Alar expanse.—12–14 mm.

Types.—In National Collection (*olivaceanum*); Canadian National Collection (*bolandanum*).

Type localities.—Massachusetts (*olivaceanum*); Ottawa, Canada (*bolandanum*).

6. EXARTEMA FRATERNANUM McDunnough

Exartema fraternanum McDunnough, Can. Ent., vol. 54, 1922, p. 38.
Cymolomia fraternana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

Apparently a valid species separable from others in this immediate group by the broken median bar of fore wing.

Represented only by the unique type.

Harpe of male genitalia as in *zellerianum* Fernald.

Alar expanse.—16 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Ontario.

7. EXARTEMA SUBNUBILUM Heinrich

(Figs. 68, 216)

Exartema subnubilum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 110.
Cymolomia subnubila Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta. 1924, p. 466.

Harpe of male genitalia figured from type; female from paratype in the American Museum from Mountain Lake Park, Md.

Bursa of female with signum.

Distribution.—New Jersey and Maryland.

Alar expanse.—15–17 mm.

Type.—In American Museum.

Type locality.—Greenwood Lake, N. J.

Food plant.—Hazel.

8. EXARTEMA ELECTROFUSCUM Heinrich

(Figs. 14, 75, 215)

Exartema electrofuscum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 110.

Cymolomia electrofusca Forbes, Memoir, 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

Male and female genitalia figured from paratypes in National Collection; male from Center Harbor, N. H. and female from Lakehurst N. J.

Bursa of female without signum.

Distribution.—New Jersey, New Hampshire, Massachusetts.

Alar expanse.—15–17 mm.

Type.—In American Museum.

Type locality.—Lakehurst, N. J.

Food plant.—Sweet Fern.

9. EXARTEMA RUSTICANUM McDunnough

(Fig. 79)

Exartema rusticanum McDunnough, Can. Ent., vol. 54, 1922, p. 38.

Cymolomia rusticana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 463

Known only from the type and paratypes in the Canadian and Barnes collections, all from the type locality. In the male genitalia hardly to be distinguished from *zellerianum* of which it may indeed be a western race. It lacks, however, the decidedly ferruginous tint in pale areas of the fore wing so characteristic of Zeller's species.

Harpe of male genitalia figured from paratype in collection Barnes.

Alar expanse.—15–16 mm.

Type.—In Canadian National Collection.

Type locality.—Onah, Manitoba.

10. EXARTEMA ZELLERIANUM (Fernald)

(Figs 63, 203)

Exartema nitidanum Zeller (not Clemens), Verh. Zool.-bot. Ges. Wien, vol. 25, 1875. p. 270.

Eccopsis zelleriana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 29.

Exartema zellerianum Fernald, in Dyar List N. Amer. Lepid., no. 5014, 1903,—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6797, 1917.

Cymolomia zelleriana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

What this name really stands for is doubtful. Zeller described and figured what he took to be a specimen of *nitidanum* Clemens. He evidently had not seen the type and was misled by Clemens' faulty description; for what he figured under that name was not

nitidanum but an apparently undescribed species. Fernald recognized this and proposed the name *zellerianum* for it. At the same time he identified as *zellerianum* specimens reared from *Betula alba*. If Zeller's description and figure are accurate this identification of Fernald's is also an error; for the *Betula* specimens match neither figure nor description. Kearfott noticed this discrepancy and after following Fernald for some years, suddenly applied the name *zellerianum* to quite a different looking insect (what I am describing further on in this paper as *Exartema trepidulum* (p. 147), and gave the manuscript name *betulana* to the moths which he, Fernald and others had previously identified as *zellerianum*. Kearfott's specimens, however, while they agree better than Fernald's with Zeller's figure, do not altogether agree with his description, and for that reason can not be accepted without considerable question. An examination of the type in London will settle the matter, for Fernald's name must apply to the specimen identified and labeled by Zeller as *nitidanum Clemens*. In the mean time, so as not to add to the confusion, I am continuing the use of the name as Fernald applied it and assuming that he was correct in identifying the Betula-feeding, ferruginous species as the true *zellerianum*.

Male and female genitalia figured from reared specimens in National Collection; male from East River, Connecticut (C. R. Ely, "VII–26–12") and female ("K. 34") without locality label but presumably from New Jersey.

Bursa of female with signum

Distribution.—Pennsylvania, New Jersey, Rhode Island, Connecticut, Maine, New Hampshire.

Alar expanse.—16–20 mm.

Type.—In British Museum.

Type locality.—Maine.

Food plant.—Betula alba.

11. EXARTEMA FOOTIANUM (Fernald)

(Figs. 76, 205)

Eccopsis footiana Fernald, Bull. Buffalo Soc. Nat. Sci., vol. 4, 1882, p. 53.

Exartema footianum Fernald, in Dyar List N. Amer. Lepid., no. 5062, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6809, 1917.

Cymolomia footiana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 470.

A distinct species easily recognized by the characters given in the key.

Harpe of male genitalia figured from reared specimen in National Collection from Staunton, Va. (*Quercus*, 26 June, 1919, Heinrich); female from American Museum from Montclair, N. J.

Bursa of female without signum.

Distribution.—Virginia, District of Columbia, Pennsylvania, New Jersey, New York.

Alar expanse.—18–22 mm.

Type.—In National Collection.

Type locality.—New York.

Food plants.—*Hamamelis*, *Quercus.*

12. EXARTEMA ATRODENTANUM (Fernald)

(Figs. 77, 217)

Eccopsis atrodentana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 71.

Exartema atrodentanum Fernald, in Dyar List N. Amer. Lepid., no. 5020, 1903.—Kearfott, Can. Ent., vol. 37, 1905, p. 206.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6802, 1917.

Cymolomia atrodentana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

In pattern much like *footianum;* but of quite a different color. The characters given in the key will readily separate the two species.

Fernald's cotypes represent a mixed series. The Canadian sp cimens correspond to what we have always identified as *atrodentanum*, while the Texas specimens represent a new species which is described in this paper (p. 160) as *exaeresimum.* I am therefore restricting the name to the form with blackish shading on costal half of median band, and designating one of the cotypes from Ontario as the holotype.

Male (harpe) and female genitalia figured from specimens in National Collection from New Brighton, Pennsylvania (H. D. Merrick, "VII–28–06" and "VIII–9–07").

Bursa of female without signum.

Distribution.—Iowa, Pennsylvania, Massachusetts, Ontario, Manitoba.

Alar expanse.—17–19 mm.

Type.—In National Collection.

Type locality.—Ontario, Canada.

13. EXARTEMA PUNCTANUM Walsingham

(Figs. 71, 212, 401)

Exartema punctanum Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 37.—Fernald, in Dyar List N. Amer. Lepid. no. 5019, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6801, 1917.

Sericoris versicolorana Clemens (not Clemens, in part) Proc. Ent. Soc. Philadelphia, vol. 4, 1865, p. 136.

Cymolomia punctana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 467.

Male and female genitalia figured from reared specimens in National Collection from East River, Conn. (male, C. R. Ely, 11 July, 1912), and Medford, Mass. (female, W. O. Ellis, 21 June, 1921).

Bursa of female with signum.

Distribution.—New York, New Jersey, Massachusetts, New Hampshire, Ontario, Quebec.

Alar expanse.—17–18 mm.

Type.—In British Museum.

Type locality.—Shasta County, Calif.

Food plant.—*Cornus.*

14. EXARTEMA CORNANUM Heinrich

(Fig. 67)

Exartema cornanum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 112.

Cymolomia cornana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 467.

Harpe of male genitalia figured from type. Female unknown.

Represented in the three collections by specimens from New Jersey, and in the Canadian National Collection by one specimen from Ottawa, Ontario.

Alar expanse.—17.5–17 mm.

Type.—In American Museum.

Type locality.—Essex County Park, N. J.

Food plant.—*Cornus canadensis.*

15. EXARTEMA INORNATANUM Clemens

(Figs. 69, 213)

Exartema inornatana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 357.

Sericoris inornatana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 134.

Exartema inornatanum Fernald, in Dyar List N. Amer. Lepid., no. 5024., 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6807, 1917.

Cymolomia inornatana Kearfott, Ins. of New Jersey, 1910, p. 539.—Forbes, Memoir 68, Cornell Univ. Agr. Expt. Sta., 1924, p. 469.

Male (harpe) and female genitalia figured from specimens in National Collection from Oak Station, Penn. (F. Marloff, "VII–17–10" and "VII–10–10").

Bursa of female without signum.

Distribution.—Pennsylvania, New York, New Jersey, Connecticut, Massachusetts, New Hampshire, Ohio, Illinois, Kansas, Texas, Quebec.

Alar expanse.—15–22 mm.

Type.—Lost (?).

Type locality.—Pennsylvania.

Food plants.—*Prunus serotina*, *Cornus*, *Quercus*, *Clethra alnifolia*, *Juglans* (Walnut).

16. EXARTEMA CLAVANUM (Walker)

(Figs. 80, 210)

Carpocapsa clavana WALKER, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 395.

Exartema inornatanum FERNALD (not Clemens), in Dyar List N. Amer. Lepid., no. 5024, 1903.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6807, 1917.

Cymolomia clavana FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 469.

This species has been listed for a long time as a synonym of *inornatanum*, and specimens have been most frequently placed under that name, though I have also seen several mixed with specimens of *nigranum* Heinrich. Some forms of the latter are very hard to separate from *clavanum* on pattern; but can be readily distinguished by the genitalia. Walker's species separates readily from *inornatanum* on both structure and color. It has the same pattern, but lacks the distinct reddish scaling on thorax and lower inner angle of fore wing so characteristic of Clemens' species.

Harpe of male genitalia figured from specimen in National Collection from Essex County, N. J. (Kearfott, "7–22–99"). In general shape and structure the male genitalia are very like those of *zellerianum*. Minor differences in the spining of the harpes of the two species are shown in figures 63 and 80. Female genitalia figured from specimen in National Collection from Onaga, Kans.

Bursa of female without signum.

Distribution.—Kansas, Iowa, Illinois, New York, New Jersey, Massachusetts, Quebec.

Alar expanse.—15–17 mm.

Type.—In British Museum.

Type locality.—"North America."

17. EXARTEMA MEDIOPARTITUM Heinrich

(Fig. 72)

Exartema mediopartitum HEINRICH, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 113.

Cymolomia mediopartita FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

Similar in pattern to *corylanum* Fernald, but lacking the ferruginous fore wing cilia of the latter. Easily distinguished by the spin-

ing of the harpe of its genitalia. So far represented only by the type and paratype in the National Collection.

Harpe of male genitalia figured from type. Female unknown

Alar expanse.—13 mm.

Type.—In National Collection.

Type locality.—Virginia.

18. EXARTEMA EXOLETUM Zeller

(Figs. 73, 227)

Exartema exoletum Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 270.—Fernald, in Dyar List N. Amer. Lepid., no. 5023, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6806, 1917.

Cymolomia exoleta Kearfott, Ins. of New Jersey, 1910, p. 538.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 469.

A striking species, easily distinguished by the suffused olivaceous-gray fore wing with its conspicuous, strongly contrasted and enlarged black apical spot.

Male (harpe) and female genitalia figured from reared specimens in National Collection from Orono, Me. (June 24 and 27, 1925; bred from currant).

Bursa of female without signum.

Distribution.—Iowa, Illinois, Ohio, Pennsylvania, New York, New Jersey, Maine, Ontario, Quebec.

Alar expanse.—14–16 mm.

Type.—In Museum Comparative Zoology.

Type locality.—Massachusetts.

Food plant.—Gooseberry, currant.

19. EXARTEMA BICOLORANUM McDunnough

Exartema bicoloranum McDunnough, Can. Ent., vol. 54, 1922, p. 40.

A small, dark, obscurely marked, cinnamon-brown species easily distinguished by its white hind wings. So far represented only by the male type and a specimen from Nova Scotia, and a doubtful male from Duluth, Minnesota in the National Museum. (These last two from the Fernald Collection.)

Alar expanse.—13–15 mm.

Type.—In Canadian National Collection.

Type locality.—Barrington Passage, Nova Scotia.

20. EXARTEMA TENEBRICUM, new species

(Fig. 74)

Plapus whitish; second joint with a blackish fuscous dot on outer side and a blackish fuscous shading at apex; third joint blackish. Face, head, and thorax blackish fuscous with a slight admixture of

sorid ocherous scaling, especially on face and collar. Fore wing blackish fuscous; maculation indistinct; antemedian and postmedian areas leaden fuscous, poorly contrasted against the slightly darker pattern markings; latter faintly dusted with scattered dull ocherous (in male) or rusty brown scaling (in female paratpye); a few faint whitish geminate marks on costa; cilia whitish blotched with blackish and with a black basal band. Hind wing whitish hyaline toward base shaded with blackish outwardly; cilia white with a black basal band; in male slight notches at veins 1*b* and 5. Under side of fore wing pale leaden fuscous; costa very faintly marked with white. Under side of hind wing hyaline white with a dark shading at apex.

Harpe of male genitalia of type figured. Female genitalia as in *subnubilum* except for slightly larger signum.

Alar expanse.—15–16 mm.

Type.—In Collection Cornell University.

Paratype.—Cat. No. 28037, U.S.N.M. Also in Cornell University Collection.

Type locality.—Argus Brook, McLean Reservation, N. Y.

Described from male type (20 July, 1924); one male paratype from "Grass Bog 3," McLean Reservation (15 July, 1924); and one female paratype from West Ridge, McLean Reservation, New York (25 July, 1924) all received from W. T. M. Forbes.

A distinct species closest to *submissanum* McDunnough in pattern; but with quite different genitalia. The suffused blackish fuscous fore wing and the whitish hyaline base of hind wing easily distinguish it from its nearest allies in Group A. (*subnubilum* and *bicoloranum*.)

GROUP B.—GENITALIA OF MALE WITH SPINED DIGITUS PROJECTING FROM NECK OF HARPE AWAY FROM SACCULUS (CLOSE TO CUCULLUS)

21. EXARTEMA QUADRIFIDUM Zeller

(Figs. 87, 226)

Exartema quadrifidum ZELLER, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 268.

Exartema inornatanum FERNALD (not Clemens) in Dyar List N. Amer. Lepid., no. 5024, 1903.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6807, 1917.

Cymolomia quadrifida FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 469.

This species has also been wrongly listed along with *clavana* Walker as a synonym of *inornatanum*. It resembles *inornatanum* somewhat in general appearance but has quite different genitalia. The whitish scaling upon fore wing is also more confined to longitudinal streaks along the veins and not so widely diffused throughout the median and postmedian areas as it is in Clemens' species.

The male genitalia of the different species in this particular group are very similar and there is little to distinguish them except minor differences in the spining of the harpes; so, for most of the species genitalia photographs are omitted, and drawings of the harpes supplied.

Harpe of male genitalia figured from specimen in National Collection from Ithaca, N. Y. (June 12, 1922). Female genitalia figured from specimen in Collection Cornell University from Peru, N. Y. (W. T. M. Forbes).

Bursa of female with slight signum.

Specimens (males) in National Collection and collection Barnes from Ithaca, N. Y., received through Dr. W. T. M. Forbes, who writes that the species is not uncommon in that locality. There is also a male from Bretton Woods, N. H., in the Barnes Collection, a rubbed and doubtful specimen from Illinois in the American Museum, a male from British Columbia in the collection of E. H. Blackmore, and a short series (males and females) in the Canadian National Collection from Manitoba, Ontario, and Quebec.

Alar expanse.—19–20 mm.

Type.—In British Museum (?).

Type locality.—Massachusetts.

Food plant.—*Cornus.*

22. EXARTEMA TILIANUM Heinrich

(Figs. 97, 214, 398)

Exartema tilianum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 113.

Cymolomia tiliana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 468.

Close to *permundanum* Clemens and *nigranum* Heinrich. From the former it is distinguished by the length of the teeth of the median bar of fore wing. These are long in *tilianum* and short in *permundanum.* From both *nigranum* and *permundanum* it is distinguished by the somewhat broadened tip of the uncus of its male genitalia. The extremity of this organ is narrower in the other two species.

Male genitalia figured from type; female from paratype in National Collection from Chicago, Ill. (Kwiat, "7–12–02").

Bursa of female without signum.

Distribution.—New Jersey, Ohio, Illinois, Missouri.

Alar expanse.—18–20 mm.

Type.—In American Museum.

Type locality.—Greenwood Lake, N. J.

Food plant.—*Tilia americana.*

23. EXARTEMA SCIOTANUM Heinrich

(Figs. 93, 207)

Exartema sciotanum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 115.

Cymolomia sciotana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 466.

Represented so far in the three collections only by the type material from the type locality.

Female genitalia and harpe of male figured from paratypes in National Collection and American Museum.

Bursa of female with signum.

Alar expanse.—19–21 mm.

Type.—In American Museum.

Type locality.—Cincinnati, Ohio.

24. EXARTEMA TREPIDULUM, new species

(Fig. 81)

Palpus whitish ocherous; second joint with considerable fuscous shading on outer side and at apex, upper edge sometimes with a faint rosy tint; third joint fuscous. Face and head ocherous fuscous shaded with smoky fuscous and with a slight admixture of purplish scales. Thorax tawny-rose or rosy fuscous; posterior tuft much darker, blackish brown. Fore wing with pale areas tawny rose or rosy fuscous, and with dark pattern markings a velvety black-brown; basal patch reduced to a narrow bar extending obliquely from dorsal margin just beyond base upward to fold, the outer edge continuing as a narrow dark line beyond fold to middle; extreme base of wing and basal half of costa pale, concolorous with antemedian area; antemedian pale area with a fine median dark line; median bar dark and well defined, narrow on costa, broad on dorsum; upper tooth very short, lower long; just above lower tooth a fine longitudinal ocherous line livides the median band; lower tooth narrowly connected to dorsal triangular portion of median band; subtornal spot practically obsolete, indicated only by a few faint lines of dark scales; subapical bar distinct, broadest at extremity, only obscurely joined to first costal dash; costal dashes brownish, a trifle paler and fainter than other dark markings. Hind wings tawny fuscous; cilia a trifle paler with a dark basal band; in male a decided notch at vein 1*b* and a slight one at vein 5.

Harp of male genitalia of type figured.

Alar expanse.—16.5–19 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28038, U.S.N.M. Also in American Museum and collection Barnes.

Type locality.—Hampton, N. H.

Described from male type, five male and one female paratypes (female without abdomen) from the type locality (S. A. Shaw, July 16 to Aug. 4). These constituted part of a miscellaneous series from various eastern localities that Kearfott had under the name *zellerianum* Fernald (=*nitidanum* Zeller not Clemens). It is quite possible that this may be the true *zellerianum.* The pattern matches very well with Zeller's figure; but the color is not right. Zeller's description calls for a species with a golden brown median bar on fore wing. In *trepidulum* this and other dark pattern markings are an almost uniform blackish brown. In as much as another and quite different species has been generally identified as *zellerianum* (see p. 140) and as the actual type is not at hand for comparison I feel that it is better to risk a possible synonym than an identification which, if wrong, would only add to the confusion of our literature. A synonym more or less does no harm; but a misidentification is always a source of trouble.

25. EXARTEMA NIGRANUM Heinrich

(Fig. 86)

Cymolomia ornatana Kearfott (ms.) Ins. New Jersey, 1910, p. 539.

Exartema nigranum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 115.

Cymolomia nigrana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 468.

Kearfott gave the different forms of this variable species a number of manuscript names, but published no descriptions and allowed only the above name (*ornatana*) to get into print. Some of the forms are strikingly different from each other in pattern; but there are many intergrading specimens and the genitalia are alike in all.

Harpe of male figured from paratype in the National Collection from the type locality. Female genitalia similar to those of *footianum* (compare fig. 205).

Bursa of female without signum.

Distribution.—Ohio, Illinois, Pennsylvania, New York, New Jersey, Ontario.

Alar expanse.—17–22 mm.

Type.—In American Museum.

Type locality.—Cincinnati, Ohio.

26. EXARTEMA HIPPOCASTANUM Kearfott

(Figs. 88, 224)

Exartema hippocastanum KEARFOTT, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 155.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6812, 1917.

Cymolomia hippocastana FORBES, Memoir 68, Cornell Univ. Agri. Exp. Sta., 1924, p. 466.

A large species with rich dark brown pattern markings, pale areas of fore wing ferruginous-ocherous or rosy-ocherous, and basal patch triparted (broken in three, longitudinally).

Aside from the type series from North Carolina in the American Museum I have seen only one other specimen, a male in the National Collection from Gainesville, Fla.

Female genitalia and harpe of male figured from paratypes in American Museum.

Bursa of female with signum.

Alar expanse.—21–22 mm.

Type.—In American Museum.

Type locality.—Black Mountains, N. C.

Food plant.—*Aesculus* (Buckeye).

27. EXARTEMA MERRICKANUM Kearfott

(Figs. 91, 222)

Exartema merrickanum KEARFOTT, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 156.—BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6810, 1917.

Cymolomia merrickana FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 466.

Similar to *corylanum* Fernald; but distinguished by the dark shading on subapical bar of fore wing. The pretornal spot is normally strongly shaded in *merrickanum*, never so in *corylanum*. Slight differences in the genitalia are shown in the figures.

Female genitalia and harpe of male figured from paratypes in the National Collection from the type locality ("VII–13–03" and "VI–29–04," H. D. Merrick).

Bursa of female without signum.

Distribution.—District of Columbia, Pennsylvania, New Jersey, New York, Wisconsin, Missouri, Iowa, Ontario.

Alar expanse.—18–21 mm.

Type.—In American Museum.

Type locality.—New Brighton, Pa.

Food plant.—*Hamamelis.*

28. EXARTEMA CORYLANUM (Fernald)

(Figs. 84, 228)

Eccopsis corylana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 71.
Exartema corylanum Fernald, in Dyar List N. Amer. Lepid., no. 5022, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6805, 1917.
Cymolomia corylana Kearfott, Ins. New Jersey, 1910, p. 538.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

A species with pattern markings of forewing obscure, color a much suffused olivaceous fuscous, a strong dark dot at apex, and conspicuous ferruginous-ocherous cilia.

Harpe of male genitalia figured from specimen in American Museum from Greenwood Lake, New Jersey (Kearfott, June 10, 1900); female from specimen in National Collection from Aweme, Manitoba (Criddle, "12–VII–05").

Bursa of female without signum.

Distribution.—New Hampshire, New Jersey, Pennsylvania, District of Columbia, Manitoba.

Alar expanse.—14–19 mm.

Type.—In National Collection.

Type locality.—White Mountains, N. H.

Food plant.—*Corylus.*

29. EXARTEMA OCHROSUFFUSANUM Heinrich

(Fig. 96)

Exartema ochrosuffusanum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923. p. 117.
Cymolomia ochrisuffusana Forbes, Cornell Univ. Agr. Exp. Sta., 1924, p. 469.

An obscurely marked species similar to *corylanum* but with fore wing normally much more suffused with yellow and without contrastingly colored cilia.

Harpe of male genitalia figured from type. Female genitalia like those of *hippocastanum* Kearfott (see fig. 224.)

Bursa of female with signum.

Distribution.—Ohio, Illinois, Kansas. In the Barnes Collection there is a specimen reared by Lindsey from larva taken feeding on Buckeye at Decatur, Ill. (moth issued May 23, 1920). Specimens reared from the same food plant have also been received from Theodore H. Frison of the University of Illinois.

Alar expanse.—19–20.5 mm.

Type.—In American Museum.

Type locality.—Cincinnati, Ohio.

Food plant.—*Aesculus* (buckeye).

30. EXARTEMA BRUNNEOPURPURATUM Heinrich

(Fig. 208.)

Exartema brunneopurpuratum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 118.

Cymolomia brunneopurpurata Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

A small brown and metallic-purple species quite different in appearance from anything else in the genus. So far represented only by the type and paratype in the National Collection.

Female genitalia figured from type.

Bursa without signum.

Alar expanse.—14–14.5 mm.

Type.—In National Collection.

Type locality.—Falls Church, Va.

Food plant.—*Alnus.*

31. EXARTEMA FERRUGINEANUM Riley

(Figs. 94, 223)

Exartema ferrugineanum Riley, Trans. St. Louis Acad. Sci., vol. 4, 1881, p. 317.—Fernald, in Dyer List N. Amer. Lepid., no 5011, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6794, 1917.

Cymolomia ferruginana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 468.

A brilliant ocher yellow species not easily confusable with anything else in this group.

Harpe of male figured from type; female genitalia from specimen in American Museum from Caldwell, N. J. (Kearfott).

Bursa of female without signum.

Distribution.—Missouri, New Jersey.

Alar expanse.—17–18 mm.

Type.—In National Collection.

Type locality.—St.Louis, Mo.

Food plant.—Plum.

32. EXARTEMA FAGIGEMMEANUM Chambers

(Fig. 92)

Exartema fagigemmaeana Chambers, Can. Ent., vol. 10. 1878, p. 74.

Exartema fagigemmeanum Fernald, in Dyer List N. Amer. Lepid., no. 5009, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6792, 1917.

Cymolomia fagigemmeana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1925, p. 468.

A variable species as far as color is concerned. Typical specimens have the pattern markings of fore wing on outer half pale rust red

and also a faint reddish suffusion on the postmedian pale area; the dark markings on basal half being tawny white. In other specimens, agreeing in all details of pattern and genitalia with the typical form, these dark markings are tawny olive throughout and there is no trace of any reddish shading.

Harpe of male genitalia figured from specimen in National Collection from Cincinnati, Ohio (Braun "VII–2–04"); female genitalia similar to those of *troglodanum* (see Fig. 219).

Bursa of female without signum.

Distribution.—Ohio, Pennsylvania.

Alar expanse.—15–19 mm.

Type.—In Museum Comparative Zoology.

Type locality.—Kentucky.

Food plant.—*Fagus sylvatica*, *Ostrya*.

33. EXARTEMA SERICORANUM Walsingham

(Fig. 95)

Exartema sericoranum Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 36.—Fernald, in Dyar List N. Amer. Lepid., no. 5013, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6796, 1917.

Cymolomia sericorana Forbes, Memoir 68, Univ. Agr. Exp. Sta., 1924, p. 466.

Cymolomia myricana Kearfott (ms), Ins. New Jersey, 1910, p. 539.

Another variable species in color, but with rather uniform pattern and structure. Most apt to be confused with *melanomesum* Heinrich from which it differs structurally in having a narrow uncus and a different grouping of the spines (*X*) on sacculus near the arch of the neck of the harpe. It also has the subapical bar of fore wing a uniform color throughout and not shading darker toward costa as is the case in *melanomesum*. Kearfott's manuscript species "*myricana*" I am unable to separate from what has generally been identified as *sericoranum*.

Harpe of male genitalia figured from specimen in National Collection from Lacy, New Jersey (Kearfott, "VII–14–07"). Female genitalia similar to those of *troglodanum*.

Bursa of female without signum.

Distribution.—Maryland, New Jersey, Connecticut, Massachusetts New Hampshire, Quebec.

Alar expanse.—15–18 mm.

Type.—In British Museum.

Type locality.—North America.

Food plant.—Myrica.

34. EXARTEMA MELANOMESUM Heinrich

(Fig. 83)

Exartema melanomesum Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 119.

Cyolomia nortana Kearfott (ms), Ins. New Jersey, 1910, p. 539.

Cymolomia melanomesa Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 466.

Kearfott never published a description of his *nortana* and the name therefore has no standing. Moreover, all the specimens he had set aside under that name except two from New Jersey are from Manitoba and are a different species which I am describing elsewhere in this paper (p. 154) as *brevirostratum.* The specimen to which he refers in the New Jersey list I found in the Barnes' collection after the description of *melanomesum.* Otherwise I should have used his manuscript name.

Harpe of male genitalia of type figured.

Distribution.—Maine and New Jersey. There is also a paratype from Ithaca, New York in the collection at Cornell University.

Alar expanse.—15–17 mm.

Type.—In collection Barnes.

Type locality.—Sebec Lake, Me.

35. EXARTEMA VALDANUM McDunnough

(Fig. 89)

Exartema valdanum McDunnough, Can. Ent., vol. 54, 1922, p. 38.

Cymolomia micantana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

This species is easily recognized by the narrow, clear white antemedian and postmedian areas bordering the broad median fuscous band on fore wing.

Harpe of male genitalia figured from specimen in National Collection from District of Columbia (male, Schoenborn). Female genitalia as in *permundanum.*

Distribution.—District of Columbia, New York, Massachusetts, Maine, New Hampshire, Quebec, Ontario, Manitoba. Except the types, these specimens (several of them reared) represent a large series which Kearfott had set aside as a new species under the manuscript name *micantanum* but which he never described.

Alar expanse.—13–18 mm.

Type.—In Canadian National Collection.

Type locality.—Fort Coulonge, Quebec.

Food plant.—Cornus.

36. EXARTEMA VERSICOLORANUM Clemens

(Fig. 206)

Exartema versicolorana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 357.

Sericoris versicolorana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 136.

Exartema versicoloranum Fernald, in Dyar List, N. Amer. Lepid., 5018, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6803, 1917.—McDunnough, Can. Ent., vol. 54, 1922, p. 39.

The specimens that have always appeared under this name in the collections are *appendiceum* Zellar. Doctor McDunnough has removed the latter from the synonymy and applied Clemens' name to a species with the pattern and color of *valdanum* but with the costa of fore wing white at base. This appears to be a valid designation, and there is no good reason for not accepting it since Dr. McDunnough's specimen (from Trenton, Ontario) agrees very well with Clemens' description, and the type is lost.

Female genitalia figured from specimen in National Collection from Buffalo, New York (W. Wild, "VII–4–09"). This and the Trenton example in the Canadian Collection are the only specimens I have seen.

Bursa of female without signum.

Alar expanse.—16–17 mm.

Type.—Lost.

Type locality.—Pennsylvania (?)

37. EXARTEMA BREVIROSTRATUM, new species

In pattern very like *valdanum* McDunnough, with a similar white antemedian band on fore wing and a whitish postmedian area. The latter, however, is always more or less shaded with rosy or ferruginous ocherous. The basal patch, median band, subtornal spot, and subapical bars are well defined, fuscous brown or ocherous brown and usually containing some blackish dusting; teeth of median band well separated, short and sharply pointed; subtornal spot more or less fusing with dorsal portion of median band. Hind wing smoky fuscous; cilia paler with a dark basal band; in male slight notches at veins 1b, 1c, and 5.

Male genitalia similar to those of *valdanum*.

Alar expanse.—15–15.5 mm.

Type.—In American Museum.

Paratypes.—Cat. No. 28039, U.S.M.M. Also in American Museum, Canadian National, and Barnes Collections.

Described from male type and 6 male paratypes from the type locality (dated July 20 to Aug. 5); and one male paratype labeled.

"Canada." One of the paratypes Kearfott had labeled "*olivaceanum* Fernald." The rest formed part of a series which he had set aside as a new species under the manuscript name "*nortanum*." I have not adopted the latter as it already appears as a manuscript name in the New Jersey list in connection with two specimens representing another species (*melanomesum* Heinrich).

E. brevirostratum is very close to *valdanum* McDunnough of which it may very likely be nothing more than a western race. Until the life histories in this group are more thoroughly worked out, however, it had better be kept as a separate species.

38. EXARTEMA PERMUNDANUM Clemens

(Figs. 90, 225)

Exartema permundana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 356.

Sciaphila meanderana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 341.

Sericoris permundana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 134.

Exartema permundanum Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 273.—Fernald, in Dyar List N. Amer. Lepid., no. 5015, 1903.—Barnes and McDunnough Check List Lepid. Bor. Amer., no. 6798, 1917.

Cymolomia gaylussaciana Kearfott (ms), Ins. New Jersey, 1910, p. 539.

Cymolomia permundana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 466.

This is a very common species and of some economic importance as an enemy of strawberry, raspberry, and huckleberry plants. It seems to have a great variety of hosts. Clemens gives *Spiraea* as the host of his type; and in the National Museum we have a specimen labeled as reared from hickory. It has also been recorded from hazel. Published records are doubtful, however, as other species are frequently identified as *permundanum*. Kearfott regarded the huckleberry feeder as a distinct species and gave it the name *gaylussaciana*. I can find nothing to separate it from typical *permundanum* either in pattern or structure. At any rate the name has no standing as a description was never published.

Female genitalia and harpe of male figured from reared specimens in National Collection; female from District of Columbia ("on raspberry, June 12—'79"); male from Waupaca, Wisconsin ("on strawberry, Chittenden no. 6790").

Bursa of female without signum.

Distribution.—District of Columbia, Maryland, Pennsylvania, New York, New Jersey, Massachusetts, New Hampshire, Ohio, Illinois, Wisconsin, Manitoba, Ontario, Quebec.

Alar expanse.—14–19 mm.

Types.—In Academy Natural Science, Philadelphia (*permundanum*); British Museum (*meanderana*).

Type localities.—Pennsylvania (*permundanum*); "North America" (*meanderana*).

Food plants.—*Spiraea salicifolia*, *Corylus* (?), *Hicoria*, blackberry, raspberry, strawberry.

39. EXARTEMA SUBMISSANUM McDunnough

(Fig. 85)

Exartema submissanum McDunnough, Can. Ent., vol. 54, 1922, p. 40.

A suffused cinnamon brown species with pattern markings of fore wing weakly contrasted against ante and postmedian paler areas, and with hind wing whitish hyaline toward base and dark smoky fuscous toward apex and termen.

Represented by the type and paratypes in the Canadian National Collection and one paratype (male) in collection Barnes, all from the type locality.

Harpe of male genitalia figured from paratype in collection Barnes.

Alar expanse.—16 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Ontario.

40. EXARTEMA NANANUM McDunnough

Exartema nananum McDunnough, Can. Ent., vol. 54, 1922, p. 39.

Exartema quebecense Heinrich, Proc. Ent. Soc. Washington, vol. 25, 1923, p. 119.

Cymolomia quebecensis Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

A tawny ferruginous species with uniformly dark brown hind wings, and with fore wing markings defined by much restricted antemedian and postmedian metallic bands. There are some slight differences between the types of *nananum* and *quebecense*, but not enough to justify us in holding the latter name.

Male genitalia very similar to those of *sericoranum* but with uncus broader towards base.

Represented only by the types.

Alar expanse.—12–13 mm.

Types.—In Canadian National Collection (*nananum*); in American Museum (*quebecense*).

Type localities.—Ottawa, Canada (*nananum*); Quebec, Canada (*quebecense*).

41. EXARTEMA MALANUM (Fernald)

(Figs. 82, 218)

Eccopsis malana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 72.
Exartema malanum Fernald, in Dyar List N. Amer. Lepid. no. 5025, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6808, 1917.
Cymolomia malana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 467.

A very uniformly marked species easily recognized by the characters given in the key. Feeds normally upon terminal buds and young leaves of apple. There is in the American Museum a specimen labeled "on plum"; but whether or not this is an authentic rearing record I can not say.

Female genitalia and harpe of male genitalia figured from reared specimens in National Collection from Olden, Mo. (J. P. Taylor, "21–June–08").

Bursa of female with signum.

Distribution.—Illinois, Iowa, Missouri, Pennsylvania, Massachusetts.

Alar expanse.—14–15 mm.

Type.—In National Collection.

Type locality.—Illinois.

Food plant.—Apple, plum (?).

Group C.—Male with Spine Cluster (*Spc*[2]) on Harpe of Genitalia Well Developed; but not upon a Projecting Digitus

42. EXARTEMA APPENDICEUM Zeller

(Figs. 98, 230, 402)

Exartema appendiceum Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 275.—McDunnough, Can. Ent., vol. 54, 1822, p. 39.
Exartema veriscoloranum Fernald, in Dyar List N. Amer. Lepid., no. 5018, 1903.—Kearfott, Bull. Amer. Mus. Nat. Hist., vol. 23, 1907, p. 157.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6803, 1917.
Cymolomia versicolorana Kearfott, Ins. New Jersey, 1910, p. 539.
Cymolomia appendicea Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 464.

Doctor McDunnough resurrected this name from the synonymy for the species we have been calling *versicoloranum*, restricting Clemens' name to a similar form with white costa at base of fore wing. In this he is justified, as Clemens' description covers both forms and there is no type of *versicoloranum* in existence to otherwise settle his concept. The usual food plant of *appendiceum* is oak but it probably feeds upon many different plants. In the National

Collection we have specimens reared from currant, raspberry, and *Dixonia.*

Male and female genitalia figured from specimens in National Collection from Oak Station, Pennsylvania (F. Marloff, "VI–25–10" and "June 17–04").

Bursa of female with signum.

Distribution.—Maine, Massachusetts, New Jersey, North Carolina, Pennsylvania, Ohio, Colorado, British Columbia, Manitoba, Ontario, Quebec.

Alar expanse.—14–16 mm.

Type.—In British Museum.

Type locality.—Massachusetts.

Food plants.—*Quercus*, *Dixonia punctalobia,* currant, raspberry.

43. EXARTEMA CONCINNANUM (Clemens)

(Figs. 18, 99, 229, 403)

Sericoris concinnana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 134.

Exartema concinnanum Fernald, in Dyar List N. Amer. Lepid., no. 5017, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6800, 1917.

Cymolomia concinnana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 465.

An olivaceous ocherous species with black dusting upon basal patch and median bar forming conspicuous blackish spots, one on lower inner angle of fore wing and the other upon costa near middle. There is also a rather prominent black spot at apex.

Male and female genitalia figured from specimens in National Collection: Male from Oak Station, Pa. (Marloff, June 3–06); female from Plummer Island, Md. (Busck, June, 1903).

Bursa of female with signum.

Distribution.—North Carolina, District of Columbia, Maryland, Pennsylvania, New York, New Jersey, Ohio, Ontario.

Alar expanse.—11–15 mm.

Type.—In Academy Natural Sciences, Philadelphia.

Type locality.—Virginia.

Food plant.—Blackberry.

44. EXARTEMA CONCINNANUM TERMINANUM McDunnough

Exartema terminanum McDunnough, Can. Ent., vol. 54, 1922, p. 41.

This form differs from typical *concinnanum* only in color and probably should not have even a varietal designation. I am keeping the name on suspicion that the variety may represent a food plant race. For a long time we have had series in the three collections under a Kearfott manuscript name ("*doxcana*").

Genitalia as in typical *concinnanum*.

Distribution.—Maryland, Pennsylvania, Ohio, New Jersey, Ontario.

Alar expanse.—11–15 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Ontario.

45. EXARTEMA FASCIATANUM Clemens

(Figs. 102, 232, 404)

Exartema fasciatana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 357.

Sciaphila decisana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 340.

Sericoris fasciatana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 134.

Exartema albofasciatum Zeller, Verh. Zool.-bot. Ges. Wien, 1875, p. 272.

Exartema fasciatanum Fernald, in Dyar List N. Amer. Lepid. no. 5021, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6804, 1917.

Cymolomia fasciatana Kearfott, Ins. New Jersey, 1910, p. 539.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 463.

This species is quite common in the vicinity of Washington during June and July. It is quite distinct from anything else in the genus and is easily recognized by the characters given in the key and by its peculiar genitalia.

Male and female genitalia figured from specimens in National Collection from Plummer Island, Md. (R. C. Shannon, June 7–14, male) and Allegheny County, Pa. (F. Marloff, "VI–22–10," female).

Bursa of female with signum.

Distribution.—Illinois, Iowa, Missouri, Kansas, Ohio, Pennsylvania, Maryland, Virginia, North Carolina, District of Columbia, New York, New Jersey, New Hampshire, Connecticut, Massachusetts, Quebec, Ontario.

Alar expanse.—13–16 mm.

Types.—In Academy Natural Science, Philadelphia (*fasciatanum*); British Museum (*decisana*, *albofasciatum*).

Type localities.—Pennsylvania (*fasciatanum*); "North America" (*decisana*); Ohio (*albofasciatum*).

Food plant.—*Rumex*.

46. EXARTEMA TROGLODANUM McDunnough

(Figs. 103, 219, 405)

Exartema troglodanum McDunnough, Can. Ent., vol. 54, 1922, p. 37.

Very like *olivaceanum* in pattern and often confused with that species. Easily distinguished by its male genitalia.

Male genitalia figured from type (photograph) and specimen in American Museum from Greenwood Lake, New Jersey (Kearfott, June 10, 1900, drawing of harpe); female from specimen in National Collection from Essex County Park, New Jersey (Kearfott, July 4). Bursa of female without signum.

Distribution.—New Jersey, Pennsylvania, Quebec.

Alar expanse.—14–18 mm.

Type.—In Canadian National Collection.

Type locality.—Meach Lake, Quebec.

47. EXARTEMA EXAERESIMUM, new species

(Figs. 101, 406)

In pattern and color like *tilianum* Heinrich, but with very different genitalia.

Antenna ocherous with a brownish fuscous spot on upper side of first joint at base; second joint brownish fuscous above. Palpus whitish ocherous; second joint with one or two fuscous spots on outer side; apical joint blackish brown. Head ocherous, shading to smoky fuscous on top. Fore wing with median areas, outer costal and pretornal spots and subcostal bar ocherous tawny; basal patch somewhat darker (more brownish) than outer pattern markings, not reaching costa, and below costa divided longitudinally by a fine whitish ocherous line; antemedian bar dividing toward dorsum, cutting deeply into basal patch and inclosing a dorsal spot detached from basal patch; costa at base whitish ocherous; antemedian and postmedian pale areas leaden metallic, faintly interlined with fuscous; median band broken below lower tooth, teeth long and narrowly separated, upper tooth touching or nearly touching subapical bar, the lower equally long and bluntly pointed, dorsal portion of median band roughly diamond shaped, separated from or barely touching pretornal spot; cilia tawny fuscous more or less shaded with dull ocherous and with a dark basal band. Hind wing ochraceous-tawny; cilia sordid whitish with a dark basal band; in male a slight notch at vein 5 and decided notches at veins 1*c* and 1*b*.

Male genitalia figured from type.

Alar expanse.—18–20 mm.

Type and paratypes.—Cat. No. 28040, U.S.N.M. Paratypes also in American Museum and collection Barnes.

Type locality.—Dallas, Tex.

Food plant.—Cornus.

Described from male type and two male paratypes from the type locality; one male paratype from Kerryville, Tex.; and one male paratype from Victoria, Tex. (labeled, "on *Cornus*, pupated IV–8–07, adult V–4–07, J. D. Mitchell"). The Dallas specimens originally formed part of the types series of Fernalds' *atrodentanum*,

which I have elsewhere in this paper (p. 141) restricted to the northern form with blackish fuscous dusting on dorsal half of median band.

In unrubbed specimens the basal patch is darker in *exaeresimum* than in *tilianum* and more completely obliterated on costa by pale scaling; but in slightly rubber specimens these differences disappear. The two, however, have such distinct genitalia that there is no confusing them. Those of *exaeresimum* have the general harpe shape of Group *B;* but the digitus is entirely lacking and there is a stout hair brush from the base of the sacculus arch different from anything else in the genus.

48. EXARTEMA FERRIFERANUM (Walker)

(Figs. 100, 220, 407)

Sciaphila? ferriferana Walker, Cat. Lepid. Brit. Mus., vol. 28, 1863, p. 343.

Sericoris gratiosana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 134.

Grapholitha (Poecilochroma) usticana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 293.

Exartema ferriferanum Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 37.—Fernald, in Dyer List N. Amer. Lepid., no. 5027, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6811, 1917.

Cymolomia ferriferana Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 469.

A strikingly marked species easily distinguished on paattern and genitalia from all other *Exartema.*

Male and female genitalia figured from reared specimens in National Collection from Bluemont, Virginia (H. B. Kirk, 1–June–1914).

Distribution.—District of Columbia, Virginia, North Carolina, Pennsylvania.

Alar expanse.—16–18 mm.

Types.—In British Museum (*ferriferanum*); In Academy of Natural Sciences, Philadelphia (*gratiosana*); location unknown (*usticana*).

Type localities.—"North America" (*ferriferanum* and *usticana*); Virginia (*gratiosana*).

Food plant.—Hydrangea.

17. Genus HEDIA Hübner

(Fig. 62)

Hedia Hübner, Verz. Schmet., 1826, p. 380. (*Penthina* Treitschke).

Genotype.—Phalaena Tinea salicella Linnaeus (Europe).

Characters as in *Olethreutes* except:

Male genitalia with cucullus usually more than half the length of harpe; uncus rather well spined inwardly at apex; cornuti absent

or much reduced. Female with two signa in bursa, developed as short thorns or (rarely) slightly impressed scobinate patches.

KEY TO THE SPECIES OF HEDIA

1. Fore wing sordid white, finely streaked longitudinally with brownish lines and with a moderately broad, hook-shaped bar from midcosta. (6) lineana.
   Fore with otherwise ..... 2.
2. Fore wing with no white or whitish areas or markings ..... (5) cyanana.
   Fore wing with one or more conspicuous white areas or patches ..... 3.
3. Terminal area of wing whitish from costa to dorsum ..... 4.
   Terminal area of wing not white; white markings limited to a large semi-oval white patch on outer half of costa, but not reaching apex. (4) chionosema.
4. Outer margin of dark area nearly vertical, at least from costa to middle; a conspicuous isolated blackish spot in disk beyond it ..... (1) separatana.
   Outer margin of dark area slightly angulate and outwardly slanting from costa to middle; no such black spot in disk or, if somewhat indicated, then touching angle of outer dark margin ..... 5.
5. Pale terminal area white; nonmetallic scaling at tornus ..... (2) ochroleucana.
   Pale terminal area white with a faintly bluish tinge; at tornus a couple of bluish metallic bars meeting to outline a faint simitriangular dark patch. (3) variegana.

1. HEDIA SEPARATANA (Kearfott)

(Figs. 263, 416)

Olethreutes separatana KEARFOTT, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 13; Ins. New Jersey, 1910, p. 539.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.

Penthina dimidiana FERNALD (not Sodoffsky), Trans. Amer. Ent. Soc., vol. 10, 1882, p. 31.

Olethreutes dimidiana FERNALD, in Dyar List. N. Amer. Lepid., no. 5034, 1903.—KEARFOTT, Can. Ent., vol. 37, 1905, p. 207.

Argyroploce separatana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6825, 1917.

The genitalia show as Kearfott contended that this species is distinct from the European *dimidiana*. Both, however, go in *Hedia*.

Male and female genitalia figured from specimens in National Collection from New Brighton (H. D. Merrick, "6–2–03," male paratype) and Oak Station, Pa. (Fred Marloff, "VI–4–11," female).

Distribution.—Massachusetts, New Hampshire, New Jersey, Maryland, Pennsylvania, Ohio, Missouri, Arkansas, Ontario, Manitoba.

Alar expanse.—10–16 mm.

Type.—In American Museum.

Type locality.—Cincinnati, Ohio.

Food plants.—Wild black cherry, larkspur, thorn.

2. HEDIA OCHROLEUCANA (Hübner)

(Figs. 264, 417)

Tortrix ochroleucana HÜBNER, Samm. Europ. Schmet. Tort., 1814, fig. 304.
Antithesia nimbatana CLEMENS, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 346.
Penthina contrariana WALKER, Cat. Lepid., Heter. Brit. Mus., vol. 28, 1863, p. 374.
Penthina consanguinana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 30.
Olethreutes ochroleucana STAUDINGER and REBEL, Cat. Lepid., vol. 2, no. 1874, 1901.—PIERCE and METCALFE, Genitalia Brit. Tort., 1922, p. 43, pl. 15.
Penthina nimbatana CHITTENDEN, Ent. Bull. U. S. Dept. Agr., no. 27, 1901, p. 83.
Olethreutes nimbatana FERNALD, in Dyar List N. Amer. Lepid., no. 5031, 1903.—KEARFOTT, Can. Ent., vol. 37, 1905, p. 207.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 455.
Olethreutes consanguinana FERNALD, in Dyar List N. Amer. Lepid., no. 5032, 1903.
Argyroploce nimbatana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6821, 1917.
Argyroploce consanguinana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6824, 1917.

There is no real difference in structure or pattern between the European *ochroleucana* and our supposed American species. The latter is variable in size and to some extent in color; but there is a complete series of intergrades between the smallest eastern *nimbatana* and the largest California *consanguinana*, and also between both these and typical *ochroleucana*. The genitalia show no variations of any significance. At most our American form can be no more than a local race. I do not see anything however to separate it even as such.

Male and female genitalia figured from specimens in National Collection from Plumas County, Calif. (June).

Distribution.—Missouri, Kentucky, Virginia, Maryland, Pennsylvania, New York, New Hampshire, Connecticut, Massachusetts, Ontario, Nova Scotia, Manitoba, Alberta, Saskatchewan, British Columbia, Washington, California, Colorado, Utah, Nevada, Arizona.

Alar expanse.—13–22 mm.

Types.—Location unknown (*ochroleucana*); in Academy Natural Science (*nimbatana*); in British Museum (*contrariana* and *consanguinana*).

Type localities.—Europe (*ochroleucana*); Massachusetts (*nimbatana*); Nova Scotia (*contrariana*); California (*consanguinana*).

Food plants.—Rose and apple.

3. HEDIA VARIEGANA (Hübner)

(Figs. 262, 418)

Tortrix variegana HÜBNER, Samm. Europ. Schmet. Tort., 1814, fig. 14.
Olethreutes variegana STAUDINGER and REBEL, Cat. Lepid., vol. 2, no. 1872, 1901.—PIERCE and METCALFE, Genitalia Brit. Tort., 1922, p. 43, pl. 15.
Argyroploce variegana KENNEL, Palaeark, Tort., Lfg. 3, Zoologica, vol. 21, Heft 54, 1913, p. 379.

A few examples of this species have been in our collections for several years either unidentified or under *consanguinana* Walsingham. There is no appreciable difference between American and European specimens.

Male and female genitalia figured from specimens in National Collection from Providence, R. I. (reared under Quaintance No. 1636, May 22, 1916, from plum, J. F. Collins).

Distribution.—Rhode Island, Nova Scotia, British Columbia.

Alar expense.—17–20 mm.

Type.—Location unknown.

Type locality.—Europe.

Food plants.—Plum (in Europe: *Pyrus*, *Sorbus*, *Prunus*, *Betula*, *Myrica*, *Quercus*).

4. HEDIA CHIONOSEMA (Zeller)

(Figs. 261, 419)

Penthina chionosema ZELLER, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 265.—MURTFELDT, Bull. 23, Div. Ent. (old series), U. S. Dept. Agr., 1891, p. 51.
Olethreutes chionosema FERNALD, in Dyar List N. Amer. Lepid., no. 5047, 1903.—WELLHOUSE, Cornell Univ. Memoir, 56, 1922, p. 1077.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 456.
Argyroploce chionosema BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6847, 1917.

A striking species easily distinguished by the character given in the key.

Male and female genitalia figured from specimens in National Collection from Vienna, Va. (Cushman, "4–30–12," male) and unknown locality (female, labeled: "on apple").

Distribution.—Missouri, Kansas, North Carolina, Virginia, Pennsylvania, New Jersey, New York, New Hampshire, Connecticut, Vermont, Ontario, Quebec.

Alar expanse.—14–18 mm.

Type.—In collection Rössler.

Type locality.—North America.

Food plants.—Apple, *Crataegus*, *Amelanchier*.

5. HEDIA CYANANA (Murtfeldt)

(Figs. 259, 415)

Penthina cyanana Murtfeldt, Amer. Ent., vol. 3, 1880, p. 14.
Olethreutes cyanana Fernald, in Dyar List N. Amer. Lepid., no. 5039, 1903.—Heinrich, Ins. Ins. Mens., vol. 7, 1919, p. 66.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.
Argyroploce cyanana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6828, 1917.

A dark semilustrous bluish-purple species with pattern markings faint and more brownish; similar in general appearance to *Olethreutes agilana* Clemens and *Esia approximana* Heinrich but structurally different.

Male genitalia figured from specimen in National Collection from Missouri (Murtfeldt, "6–25"); female from specimen in American Museum from unknown locality.

Distribution.—Missouri, Kansas, Iowa, Indiana, New Jersey, Manitoba.

Alar expanse.—8–15 mm.

Type.—In collection Cornell University.

Type locality.—Missouri.

Food plant.—Rose,

6. HEDIA (?) LINEANA (Fernald)

(Fig. 260)

Eucosma lineana Fernald, Journ. New York Ent. Soc., vol. 9, 1901, p. 501; in Dyar List N. Amer. Lepid., no. 5116, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6952, 1917.

This species does not fit into any of the genera we have, and is only temporarily referred here. In the absence of a male I do not feel justified in proposing a new genus, but have no doubt that one must eventually be erected. In female genitalia characters (the two thorn-like signa) *lineana* would go easily enough into *Hedia*; but the wing shape and venation are wrong; the fore wing termen is concave, vein 2 is strongly bent, running up to termen parallel to 3, and the upper internal vein of cell is from between 9 and 10. The pattern, on the other hand, suggests *Exartema*.

Aside from the female type (without abdomen) I have seen only one other specimen, a female from Porto Bello, Panama (August Busck, March, 1911), also in the National Collection. Genitalia of this latter figured.

Alar expanse.—15–16 mm.

Type.—In National Collection.

Type locality.—Palm Beach, Fla.

Food plant.—*Anona laurifolia.*

18. Genus OLETHREUTES Hübner

(Figs. 13, 40)

Olethreutes Hübner, Tentamen, 1806 (=*Roxana* Stephens).
Genotype.—Phalaena Tinea arcuella Clerck (Europe).
Argyroploce Hübner, Verz. Schmet., 1826, p. 379.
Genotype.—Phalaena Tinea arbutella Linnaeus (Europe).
Phiaris Hübner, Verz. Schmet., 1826, p. 381.
Genotype.—Tortrix micana Hübner (Europe).
Celypha Hübner, Verz. Schmet., 1826, p. 382. (= *Sericoris* Treitschke).
Genotype.—Phalaena rivulana Scopoli (= *conchana* Hübner) (Europe).
Orthotaenia Stephens, Cat. Brit. Ins., vol. 2, 1829, p. 181.
Genotype.—Tortrix striana Denis and Schiffermüller (Europe).
Selenodes Guenée, Eur. Microlep. Index Method., 1845, p. 26.
Genotype.—Selenodes dalecarliana Guenée (Europe).
Mixodia Guenée, Eur. Microlep. Index Method., 1845, p. 26.
Genotype.—Pyralis schulziana Fabricius (Europe).

Thorax with posterior tuft.

Forewing smooth; termen convex or straight; 12 veins; all separate; 7 to termen; 8 and 9 normally approximate at base, rarely much separated (*costimaculana*); upper internal vein of cell from between 10–11; 3, 4, and 5 not aproximate at termen; 2 from cell usually before 2/3, rarely beyond 2/3 (*griseoalbana*), usually straight, rarely bent upward beyond middle (*costimaculana*).

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; 5 approximate to 4 at base; termen without appreciable notches at veins 5, 1*c*, or 1*b*; inner margin simple or bearing, in male, a slight chitinous ridge or thickening of the membrane.

Hind tibia of male with hair pencile from base.

Male genitalia with harpe elongate and sometimes bearing a short row of flat hair-like spines on outer surface, usually without such; cucullus seldom more than half the length of harp, narrow, densely spined; sacculus normally extended in an arch over and pocketing neck; spine clusters Spc^1 and Spc^2 usually present and strongly developed, latter (Spc^2) variously modified; spines at base of sacculus short and weak. Uncus present; sometimes abbreviated but normally developed; weakly chitinized; tip weakly spined (except in *costimaculana*, *denotana*, *mengelana*, and a few exotic species). Socii present, often small; hairy and flexible. Gnathos normal. Aedoeagus short or long; very slightly bent; cornuti present or absent, if present one, two or a small cluster of short spines.

Female genitalia with signum present or absent; when present a scobinate patch occasionally produced into a hollow spine. Ductus bursae moderately long; unchitinized except near genital opening.

As it stands this genus is still considerable of a lump and probably should be further divided; but as yet I have found no characters that will satisfactorily group its conflicting elements. It represents, I believe, the parent stem of the family.

The type species (*arcuella*) is strikingly different in pattern from anything else in the genus, and should its far eastern variety prove to have a real *Exartema* lobe on the male hind wing as claimed by Walsingham (see p. 130), I should be inclined to restrict the genus to that species and apply the name *Argyroploce* to the American species.

KEY TO THE SPECIES OF OLETHREUTES

1. Greater part of fore wing whitish; conspicuous dark markings a bluish black basal patch and a similar colored subtornal spot. (1) griseoalbana.
   Fore wing otherwise ---- 2.
2. Fore wing brownish with a few small black spots on median and basal areas and a conspicuous square, pinkish-white blotch on costa beyond middle; other pale areas suffused with dark scaling -- (28) costimaculana.
   Fore wing otherwise ---- 3.
3. Fore wing with a clear white semicircular spot on dorsum just beyond base; terminal quarter of wing white, faintly marked with brownish fuscous; rest of wing brown ---- (29) devotana.
   Fore wing otherwise ---- 4.
4. Fore wing with a single, rather broad, clear white antemedian fascia and a more or less extended white postmedian area defining a distinct brownish or dark grayish fuscous median band ---- 5.
   Antemedian and postmedian areas otherwise; when whitish more or less suffused or mottled with ocherous or fuscous, or broken into narrow irregular lines ---- 10.
5. Postmedian white area a narrow outwardly angulate band, narrower than antemedian white band ---- (16) carolana.
   Postmedian white area broad and occupying greater part of outer quarter of wing; when reduced by terminal dark shading and markings, inwardly angulate ---- 6.
6. Dark markings olivaceous fuscous ---- (31) buckellana albidula.
   Dark markings dark greyish fuscous ---- 7.
7. Dark markings in terminal area of fore wing obsolete, or only a faint shading indicating remains of subapical bar; median band divided at middle by a fine longitudinal white streak ---- (19) dilutifuscana. (18) bipartitana (part).
   Dark markings in terminal area more or less pronounced; subapical bar at least present, and usually a dark shade between it and apex; no white streak dividing median band ---- 8.
8. Hind tibiae banded ---- 9.
   Hind tibiae not banded ---- (18) bipartitana (part).
9. Outer margin of median dark band distinctly toothed below costa. (17) polluxana.
   Outer margin of median band not toothed below costa ---- (20) glaciana.

10. Fore wing with median area ferruginous ocherous; postmedian area darker. (2) **osmundana.**
Fore wing otherwise; if rather pale ferruginous brown in middle, than with postmedian area paler or broken by irregular white lines ..... 11.
11. Fore wing showing to the naked eye a number of shining metallic bluish spots or lines ..... 12.
Metallic markings obscured or obliterated; not apparent to the naked eye ..... 20.
12. Cilia of fore wing conspicuously white toward apex; dark on lower half of termen ..... 13.
Cilia of fore wing rather uniformly colored; if somewhat whitish, not conspicuously so toward apex ..... 14.
13. Hind wing uniformly dark throughout on upper and under side; cilia only white toward apex ..... (6) **siderana chalybeana.**
Hind wing whitish toward base; dark smoky fuscous beyond, the dark areas narrower on under than on upper side of wing; cilia shining white almost to inner angle ..... (5) **albiciliana.**
14. Fore wing no paler in postmedian area than at middle ..... 15.
Fore wing paler in postmedian area than at middle ..... 16.
15. Head bright ocherous toward front ..... (3) **auricapitana.**
Head dark fuscous toward front ..... (4) **agilana.**
16. Basal patch, median band, subtornal spot and subapical bar of fore wing all distinctly defined to the naked eye ..... 17.
One or more of the above markings obscured by dark dusting on pale antemedian area or pale suffusion on dark areas; median band often fusing with dark basal and subtornal patches ..... 18.
17. Pale dusting on dark areas of fore wing ferruginous brown ..... (7) **sordidana.**
Pale dusting on dark areas of fore wing light ocherous ..... (8) **galaxana.**
18. Underside of fore and hind wings concolorous, dark shining smoky fuscous. (11) **coruscana.**
Underside of hind wing much paler than underside of fore wing, whitish ..... 19.
19. Fore wing with termen nearly vertical, slanting only slightly; tornus rather abruptly rounded ..... (9) **constellatana.**
Fore wing with termen slanting in even curve from apex to around tornus; tornus evenly rounded ..... (10) **astrologana.**
20. Fore wing with antemedian and postmedian areas whitish ocherous and sharply defining a brownish median band ..... 21.
Fore wing with antemedian and postmedian areas more or less whitish, but with no ocherous tint; dark median band sometimes sharply defined but often mottled and broken by pale scaling ..... 24.
21. Median dark band of fore wing produced at middle into a single outwardly projecting tooth ..... (24) **septentrionana.**
Median dark band not produced at middle; or, if so, into two teeth ..... 22.
22. Subapical bar of fore wing extending in a broad band from tornus to costa. (12) **puncticostana.** (13) **puncticostana major.**
Subapical bar from above tornus, and terminating, as an appreciable band, before costa ..... 23.
23. Median band partially divided by a faint longitudinal pale streak (male); or completely inclosing a white discal dot (female) ..... (14) **deprecatoria.**
No such longitudinal pale streak in median band; white discal dot, where distinguishable, but partially inclosed by median band ..... (15) **cespitana.**

24. Dark median band complete and sharply defined, outwardly biangulate, well separated from subtornal spot ..... (21) **nordeggana.**
Dark median band usually mottled and broken by pale patches, poorly defined, and very irregular in outline; when complete and defined, fused with subtornal spot (in species having a mottled and broken median band the subtornal spot is frequently well separated from the remains of dark median band) ..... 25.

25. Fore wing a suffused mottling of ashy gray and blackish fuscous with no well-defined whitish areas except a white dot at end of cell, and with none of the usual dark pattern markings distinctly defined.
(23) **intermistana.**
Fore wing more or less mottled; but always with one or more definite whitish areas beside the occasional white dot at end of cell, and with one or more of the usual dark pattern markings distinctly defined ..... 26.

26. Subtornal dark spot of fore wing distinctly separated from dark median band and more or less extended ..... 27.
Subtornal dark spot fused with median band ..... 29.

27. Fore wing with a well-defined subapical bar touching at its discal extremity the apex of subtornal spot ..... (22) **schulziana.**
Fore wing without subapical bar, or latter represented only by a small dark spot on termen above tornus ..... 28.

28. Fore wing wider toward termen than at middle ..... (25) **inquietana.**
Fore wing no wider toward termen than at middle ..... (26) **bowmanana.**

29. Postmedian whitish area of fore wing most extended toward costa.
(27) **mengelana.**
Postmedian whitish area most extended toward tornus ..... (30) **buckellana.**

1. OLETHREUTES GRISEOALBANA (Walsingham)

(Figs. 236, 422)

Exartema griseoalbana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 38.

Olethreutes griseoalbana Fernald, in Dyar List N. Amer. Lepid., no. 5036, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.

Argyroploce griseoalbana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6815, 1917.

In this species vein 2 of fore wing branches from the cell very close to outer three-fourths, further out in fact than it does in any other species in the genus. However, there doesn't seem to be any good reason for generic separation.

Male genitalia figured from specimen in National Collection from Hampton, N. H. (S. A. Shaw, "VIII–14–1907"); female from specimen in American Museum from Cincinnati, Ohio (A. F. Braun).

Bursa of female with weak signum.

Distribution.—Ohio, Pennsylvania, New Hampshire, North Carolina.

Alar expanse.—14–15 mm.

Type.—In British Museum.

Type locality.—Eastern States of North America.

2. OLETHREUTES OSMUNDANA (Fernald)

(Figs. 234, 423)

Penthina osmundana Fernald, Can. Ent., vol. 11, 1879, p. 156.
Olethreutes osmundana Fernald, in Dyar List N. Amer. Lepid., no. 5043, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.
Olethreutes ochromediana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 11.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.
Argyroploce osmundana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6850, 1917.
Argyroploce ochromediana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6851, 1917.

There is an authentic male of *osmundana* from Maine in the Cornell collection labeled by Fernald. It agrees in pattern and genitalia with Kearfott's *ochromediana*. I can not find any of the differences that Kearfott uses to separate his supposed species.

Male and female genitalia figured from specimens in National Collection from Hampton, N. H. (male, S. A. Shaw, "VIII–14–1907") and Samons, Mass. (female, reared by W. O. Ellis from *Osmunda cinnamomea*, 28 May, 1921).

Bursa of female without signum.

There is a male in the National Collection reared from larvae feeding on *Pteridium aquilinum* ("7–7–16," Witesbog, N. J., Quanitance no. 12743, H. H. Scammell, collector). Kearfott also records (Ins. New Jersey, 1910, p. 540) seeds of *Ambrosia trifida* as a food plant.

Distribution.—District of Columbia, Pennsylvania, New Jersey, New Hampshire, Massachusetts, Maine.

Alar expanse.—11–13 mm.

Types.—In National Collection (*osmundana*); in American Museum (*ochromediana*).

Type localities.—Orono, Me. (*osmundana*); Hazelton, Pa. (*ochromediana*).

Food plants.—*Osmunda regalis*, *O. cinnamomea*, *Pteridium aquilinum*, *Ambrosia trifida* (?).

3. OLETHREUTES AURICAPITANA (Walsingham)

(Figs. 238, 424)

Sericoris auricapitana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 33.
Olethreutes auricapitana Fernald, in Dyar List N. Amer. Lepid. no. 5052, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.
Argyroploce auricapitana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6830, 1917.

Male and female genitalia figured from specimens in National Collection; male from Great Falls, Va. (Busck); female from Essex County Park, N. J. (Kearfott).

Bursa of female with signum.

Distribution.—New Jersey, Virginia, Nova Scotia.

Alar expanse.—10–12 mm.

Type.—In British Museum.

Type locality.—Pennsylvania (?).

Food plant.—Betula lutea.

4. OLETHREUTES AGILANA (Clemens)

(Figs. 235, 439)

Endopiza ? agilana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 359.

Olethreutes agilana Fernald, in Dyar List N. Amer. Lepid., no. 5053, 1903.—Kearfott, Ins. New Jersey, 1910, p. 540.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.

Olethreutes abiciliana Busck (not Fernald), Proc. Ent. Soc. Washington, vol. 11, 1909, p. 98.

Argyroploce agilana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6831, 1917.

A specimen in the collection of the Philadelphia Academy has been labeled by Fernald as the probable type. Since it matches the description and agrees with the general concept of the species it may be so regarded.

The metallic spots are duller in *agilana* than in the other dark species with similar markings; but in fresh unrubbed specimens are easily seen without a lens. They only become completely obscured in greasy specimens.

Male and female genitilia figured from specimens in National Collection from Ithaca, N. Y. (male, reared, E. H. Hausman, May, 1920) and Oak Station, Pa. (female, F. Marloff, "June 10–07").

Bursa of female without signum.

Distribution.—Ohio, Pennsylvania, New York, New Jersey, Maryland, Virginia, Massachusetts, Ontario.

Alar expanse.—11–14 mm.

Type.—In Academy Natural Science, Philadelphia.

Type locality.—Pennsylvania (?)

Food plant.—Impatiens (larva a stem borer).

5. OLETHREUTES ALBICILIANA (Fernald)

(Figs. 237, 425)

Sericoris albiciliana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 70.

Olethreutes albiciliana Fernald, in Dyar List N. Amer. Lepid., no. 5054, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.

Argyroploce albiciliana Barnes and McDunnough, Check List Lepid. Bor Amer., no. 6832, 1917.

Male and female genitalia figured from specimens in National Collection from Aweme, Manitoba (Criddle, "13–VII–05," male) and Bretton Woods, White Mountains, N. H. ("July 8–15," female).

Bursa of female with signum.

Distribution.—South Carolina, Pennsylvania, New Jersey, New Hampshire, Maine, Ohio, Manitoba.

Alar expanse.—12–15 mm.

Type.—In National Collection.

Type locality.—Orono, Me.

Food plant.—*Spiraea salicifolia* (Kearfott notes).

6. OLETHREUTES SIDERANA CHALYBEANA (Walsingham)

(Fig. 427)

Sericoris chalybeana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 34.

Olethreutes chalybeana FERNALD, in Dyar List. N. Amer. Lepid., no. 5055, 1903.

Argyroploce chalybeana BARNES AND MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6833, 1917.

In structure and pattern Walsingham's *chalybeana* matches very closely the typical European *siderana* Treitschke (fig. 426). Specimens of the latter in the National Museum, however, are a trifle different in color. The pale shade in cilia of fore and hind wings is whiter in American than European specimens, the dark line at base of fore wing cilia is also uninterrupted while in the European specimens it is partially obliterated below apex by encroachment of the pale shading of the cilia, and the yellow dusting of fore wing is paler—less orange colored—than in European examples. It is doubtful if such slight differences will hold consistently through large series from any given locality. I have only seen three American and a half dozen European specimens, and in these they do. I am therefore keeping the Walsingham name for the present, upon suspicion that it may designate a distinguishable local race. Both forms occur in rather high altitudes. In Europe *siderana* feeds upon *Spiraea*. None of the American specimens have been reared.

Male genitalia figured from cotype in National Collection. Female genitalia similar to those of *albiciliana*.

Besides the cotype, we have in the National Collection a male from Kaslo, British Columbia. There is also a male from Glacier National Park, Mont., in the Barnes Collection, and two specimens (male and female) from Kaslo in the Canadian National Collection.

Alar expanse.—15–16 mm.

Type.—In British Museum.

Type locality.—Siskiyou Mountains, on the borders of Oregon and California.

Food plant.—Unknown (probably *Spiraea*).

7. OLETHREUTES SORDIDANA (McDunnough)

(Fig. 428)

Argyroploce sordidana McDunnough, Can. Ent., vol. 54, 1922, p. 43.

In genitalia close to *constellatana* Zeller. In pattern and general habitus resembling some of the smaller specimens of *galaxana* and *constellatana*, but much darker, above and beneath, and more brownish than either. So far represented only by the type material in the Canadian National and Barnes Collections.

Male genitalia figured from paratype in collection Barnes.

Alar expanse.—16 mm.

Type.—In Canadian National Collection.

Type locality.—Coliseum Mountain, Nordegg, Alberta.

8. OLETHREUTES GALAXANA Kearfott

(Figs. 241, 431)

Olethreutes galaxana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 9.

Olethreutes glitranana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 9.

Argyroploce galaxana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6836, 1917.

Argyroploce glitranana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6837, 1917.

There are no real differences in genitalia, color, or pattern between Kearfott's supposed two species. In size the more easterly form (*glitranana*) averages smaller than specimens from British Columbia; but in Manitoba and Vancouver Island there are intergrades, so the forms can not be distinguished even as races.

Male and female genitalia figured from specimens in National Collection from Victoria, British Columbia (male paratype of *galaxana*), and Regina, Saskatchewan (female paratype *glitranana*).

Bursa of female with signum developed as a scobinate patch with a small central spine.

Distribution.—Colorado, Saskatchewan, Manitoba, Alberta, British Columbia, Vancouver, Alaska.

Alar expanse.—16–23 mm.

Types.—In American Museum.

Type localities.—Vernon, British Columbia (*galaxana*); Regina, Saskatchewan (*glitranana*).

9. OLETHREUTES CONSTELLATANA (Zeller)

(Figs. 240, 429)

Sericoris constellatana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 279.

Olethreutes constellatana Fernald, in Dyar List N. Amer, Lepid., no. 5057, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 454.

Argyroploce constellatana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6835, 1917.

Very similar to the larger form of *astrologana* Zeller and frequently confused with it. The two species have different genitalia and may also be distinguished by the shape of the fore wing. The latter is broader and has the termen a little more vertical in *constellatana* than in *astrologana*.

Male and female genitalia figured from specimens in National Collection from Kansas (male) and Arendtsville, Pa. (S. W. Frost, June 8, 1919, female).

Bursa of female with signum a short hollow spine.

Distribution.—New York, New Hampshire, Massachusetts, Pennsylvania, Maryland, Virginia, West Virginia, Ohio, Illinois, Iowa, Kansas, Wisconsin, Ontario, Quebec.

Alar expanse.—18–22 mm.

Type.—In British Museum?

Type locality.—Ohio.

10. OLETHREUTES ASTROLOGANA (Zeller)

(Figs. 239, 433)

Sericoris astrologana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 281.

Olethreutes astrologana Fernald, in Dyar List N. Amer. Lepid., no. 5062, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 454.

Olethreutes coronana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 10.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 454.

Argyroploce astrologana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6843, 1917.

Argyroploce coronana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6838, 1917.

The larger western specimens of this species closely resemble *constellatana* Zeller and the smaller eastern specimens are very similar to *coruscana* with which *astrologana* has been frequently confused. In superficial characters it differs from the former in having termen of fore wing more slanting, and from the latter in having under side of hind wing distinctly paler than under side of fore wing. The genitalia are characteristic. The species is variable as to size and intensity of dark scaling on the fore wing. The small eastern and large western forms could be easily separated as local races, did not

intergrading specimens occur throughout the middle states. Kearfott's *coronana* is only a dark specimen of the western form. In genitalia it is a typical *astrologana*.

Male and female genitalia figured from specimens in National Collection from Long Island, New York (male) and Kaslo, British Columbia (Dyar, "No. 20792," female).

Bursa of female with signum a scobinate patch with a small weak central spine.

Distribution.—Maryland, Virginia, New York, Maine, Illinois, Iowa, Missouri, New Mexico, Texas, Ontario, Alberta, Manitoba, British Columbia.

Alar expanse.—14–19 mm.

Types.—In British Museum (*astrologana*); American Museum (*coronana*).

Type localities.—Texas (*astrologana*); Aweme, Manitoba (*coronana*).

11. OLETHREUTES CORUSCANA (Clemens)

(Figs. 242, 430)

Antithesia coruscana Clemens, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 346.

Carpocapsa ferrolineana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 395.

Sericoris argyroclana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 277.

Olethreutes coruscana Fernald, in Dyar List N. Amer. Lepid., no. 5056, 1903.—Dyar, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 925.—Kearfott, Can. Ent., vol. 37, 1905, p. 207.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.

Argyroploce coruscana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6834, 1917.

Very like smaller eastern specimens of *astrologana* but with very different genitalia and with under side of fore and hind wings both of the same dark shade. The male genitalia are similar to those of *constellatana;* but differs consistently in one very significant detail; in *constellatana* the spining on the cucullus of harpe extends along the arch over the neck of the harpe and fuses in with spine group, *Spc*[1]; while in *coruscana* it ends abruptly at the beginning of the arch and the spine group, *Spc*,[1] is isolated.

Male and female genitalia figured from specimens in National Collection from Washington, District of Columbia ("28–5–85" and "24–5–79").

Distribution.—North Carolina, Virginia, Maryland, District of Columbia, Pennsylvania, New York, New Jersey, Massachusetts, New Hampshire, Illinois, Iowa.

Alar expanse.—14–17 mm.

Types.—In Academy Natural Sciences, Philadelphia (*coruscana*); British Museum (*ferrolineana* and *argyroelana*).

Type localities.—Pennsylvania? (*coruscana*); "North America" (*ferrolineana*); New York (*argyroelana*).

12. OLETHREUTES PUNCTICOSTANA (Walker)

(Fig. 254)

Sciaphila puncticostana WALKER, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 339.

Penthina murina PACKARD, Proc. Boston Soc. Nat. Hist., vol. 11, 1867, p. 60.

Sericoris puncticostana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 33.

Olethreutes murina FERNALD, in Dyar List N. Amer. Lepid., no. 5042, 1903.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 457.

Olethreutes puncticostana FERNALD, in Dyar List N. Amer. Lepid., no. 5063, 1903.

Argyroploce puncticostana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6844, 1917.

Argyroploce murina BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6857, 1917.

According to Knight's figure in the Kearfott Collection at the American Museum this species is the eastern equivalent of *major* Walsingham. In the collections specimens of *cespitana*, *urticana*, and *deprecatoria* have been indiscriminately referred to it. I was inclined to apply the name to the large northern and western form of *cespitana* Hübner (*instrutana* Clemens); but according to August Busck, who examined the type, *puncticostana* lacks the dark shading on the pale terminal area of fore wing which is present in all specimens of *cespitana*.

We have in the National Collection two males from New York and Quebec received through Dr. W. T. M. Forbes. These agree in genitalia with *major* Walsingham. In the Canadian National Collection there are several small specimens (15–17 mm.) from New York, and a series of larger (17–20 mm.) specimens from Ontario and Central Alberta (Edmonton). There is also a male in the Barnes Collection from Mount Washington, N. H. ("July 24–31, 4,000 ft."). Packards' *murina* is a straight synonym. The type at Cambridge agrees in both pattern and genitalia with what we have under the Walker name.

Female genitalia figured from specimen in the Cornell University collection from North Twin Brooks, N. Y. (W. T. M. Forbes, "10–7–18").

Bursa of female with signum a small impressed scobinate patch.

Alar expanse.—15–20 mm.

Types.—In British Museum (*puncticostana*); in Museum Comparative Zoology (*murina*).

Type localities.—Nova Scotia (*puncticostana*); Caribou Island, Labrador (*murina*).

13. OLETHREUTES PUNCTICOSTANA MAJOR (Walsingham)

(Fig. 444)

Penthina major Walsingham, Trans. Ent. Soc. London, 1895, p. 502.
Olethreutes major Fernald, in Dyar List N. Amer. Lepid., no. 5058, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta. 1924, p. 454.
Argyroploce major Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6839, 1917.

A somewhat larger Rocky Mountain and Pacific coast variety of *puncticostana*. It probably does not deserve to be distinguished even as a race; but should be kept as such until intergrading forms are recovered. In pattern and genitalia *metallicana* Hübner is very close. It is possible that our American forms are varieties of the European species. I believe, however, that they are distinct.

Male genitalia figured from specimen in National Collection ("Colo. 2168").

Distribution.—British Columbia, Alberta (Banff). There are also male and female specimens from Atlin, British Columbia, in the collection of Mr. E. H. Blackmore.

Alar expanse.—23–25 mm.

Type.—In British Museum.

Type locality.—Loveland, Colo.

14. OLETHREUTES DEPRECATORIA, new species

(Figs. 247, 436)

Palpi, face, and head whitish ocherous; some faint fuscous dusting on palpus toward apex of second joint; third joint pale. Thorax pale acherous with slight peppering or cross streaking of dark fuscous. Fore wing dull whitish ocherous with brownish or grayish fuscous pattern markings; pale antemedian and postmedian areas finely lined with fuscous; dark markings dusted with ocherous scales, giving them a rather dull ashy fuscous shade, especially in the males (the females have the dark areas less overlaid with pale scaling and are more brilliant and more sharply contrasted against the pale areas); dark basal patch sharply excavated below middle, vertically lined with ocherous; median band narrow on costa, outwardly rounded at end of cell and inclosing a faint whitish dot, more or less coalescing with pretornal spot on dorsum (especially in males)

and usually partially interrupted at middle by a faint pale streak (not noticeable in most of the females but rather distinct in the males); subapical bar from termen near tornus to vein 8; costa with four outer costal spots; a faint fuscous shading between apical spot and subapical bar; cilia whitish with a fuscous patch at apex and opposite base of subapical bar. Hind wing smoky fuscous; cilia whitish with a dark basal band. Underside of hind wing whitish, much paler than under side of fore wing. Hair pencile on hind tibia of male pale fuscous.

Male genitalia of type figured. Female genitalia figured from paratype in National Collection from Shasta Retreat, Calif.

Bursa of f male with signum a weak scobinate patch.

Alar expanse.—15–19 mm.

Type and paratypes.—Cat. No. 28041, U.S.N.M. Paratypes also in Canadian National Collections, American Museum, and collection Barnes.

Type locality.—Wellington, British Columbia.

Described from male type, 5 male and 4 female paratypes from the type locality (June and July); 3 male paratypes from Hot Springs, Green River, Wash.; 1 male paratype from Oysterville, Wash. (taken in cranberry bog by H. K. Plank, "6–21–18," Quaintance No. 15533); 1 female paratype from Grayland, Wash. (Quaintance No. 15502, H. K. Plank, collector, "8–15–18"); 1 male paratype from Clatsop, Wash. (Quaintance No. 15510, H. K. Plank, "7–9–18"); and 2 male and 2 female paratypes from Shasta Retreat, Siskiyou County, Calif.

In addition to the above I have before me four males from New Hampshire ("Mount Washington, 4,000 ft., July 24–31," 2 specimens; and Glen House, White Mountains, 1,600 ft., Aug. 1–7," 2 specimens) which belong here but which I hesitate to include among the types as they may represent a distinct eastern race. The pattern and genitalia are typical but the white areas of fore wing show little or none of the strong ocherous shading characteristic of western specimens.

In the collections this species has appeared most frequently under the name *urticana* Hübner. It has also been identified as *puncticostana*, and one of the cotypes had been labeled *chalybeana* Walsingham by Kearfott. In genitalia and general appearance it most closely resembles the European *lacunana* Duponchel and *umbrosana* Freyer. It differs from both however in the spining of the harpe of the male genitalia. The differences are slight but appear to be constant.

15. OLETHREUTES CESPITANA (Hübner)

(Figs. 245, 434)

Tortrix cespitana Hübner, Samm. Eur. Schmet. Tort., 1814, figs. 244–245.
Rhyacionia flavofasciana Westwood and Humphreys, vol. 2, 1844, p. 173, pl. 99, fig. 16.
Sericoris instrutana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 135.
Sericoris poana Zeller, Verh. Zool.-bot. Ges. Wien, 1875, p. 282.
Eucosma cespitana Meyrick, Hand Book Brit. Lepid., 1895, p. 468.
Olethreutes cespitana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 1927, 1901.
Olethreutes instrutana Fernald, in Dyar List N. Amer. Lepid., no. 5064, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 453.
Olethreutes flavofasciana Kearfott, Ent. News, vol. 20, 1909, p. 53; Ins. New Jersey, 1910, p. 539.
Argyroploce instrutana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6862, 1917.
Celype cespitana Pierce and Metcalf, Genitalia Brit. Tort., 1922, p. 52, pl. 17.

There are no differences in pattern or genitalia b tween the European *cespitana* and the American *instrutana* and I have no doubt that they are but one species. Our American specimens vary considerably in size. In Colorado and western California there is a large variety measuring from 17 to 20 mm. alar expanse. Specimens of this have been identified—and I now think incorrectly—as *puncticostana* Walker. I am not differentiating it as a race because there are many Colorado specimens intergrading in size between it and the smaller eastern form. Colorado specimens range all the way from 12 to 20 mm. expanse; typical eastern specimens from 11 to 16 mm. The genitalia of all are alike, not varying in the slightest degree.

Male and female genitalia figured from specimens in National Collection from Clear Creek, Colo. (Oslar, male), and Washington, D. C. (Busck, female).

Bursa of female with signum a weak scobinate patch.

Distribution.—North Carolina, District of Columbia, Pennsylvania, New Jersey, New York, New Hampshire, Massachusetts, Ohio, Kentucky, Tennessee, Iowa, Nebraska, Missouri, Wisconsin, South Dakota, Colorado, Utah, California, Washington, British Columbia, Alberta, Manitoba, Ontario.

Alar expanse.—11–20 mm.

Types.—Location unknown (*cespitana* and *flavofasciana*); Academy Natural Science, Philadelphia (*instrutana*); British Museum (*poana*).

Type localities.—Europe (*cespitana*); England (*flavofasciana*); Virginia (*instrutana*); Ohio (*poana*).

Food plants.—Clover, grass, horse chestnut (in Europe, *Spartium*).

16. OLETHREUTES CAROLANA (McDunnough)

(Figs. 243, 438)

Argyroploce carolana McDUNNOUGH, Can. Ent., vol. 54, 1922, p. 46.
Olethreutes carolana FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 451.

A distinct species. Represented only by the type material in the Canadian National Collection.

Genitalia figured from type (male) and paratype (female) from Trenton, Ontario ("11–6–11, Evans").

Alar expanse.—14 mm.

Type.—In Canadian National Collection.

Type locality.—Ottawa, Ontario.

17. OLETHREUTES POLLUXANA (McDunnough)

(Figs. 244, 445)

Argyroploce polluxana McDUNNOUGH, Can. Ent., vol. 54, 1922, p. 45.
Olethreutes polluxana FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

Male genitalia figured from paratype in collection Barnes from the type locality; female from specimen in National Collection from Mount Washington, N. H.

Bursa of female with signum a scobinate patch. The ductus Bursae is chitinized for a considerable part of its length, rather an unusual character for this genus.

Distribution.—Alberta, Ontario, New Hampshire. There is also a male from Peru, N. Y., in the Cornell University Collection.

Alar expanse.—18–19 mm.

Type.—In Canadian National Collection.

Type locality.—Nordegg, Alberta.

18. OLETHREUTES BIPARTITANA (Clemens)

(Figs. 249, 435)

Antithesia bipartitana CLEMENS, Proc. Acad. Nat. Sci., Philadelphia, 1860, p. 346.—PACKARD, Guide Study Ins., 1869, p. 333.
Penthina similisana WALKER, Cat. Lepid. Heter, Brit. Mus., vol. 28, 1863, p. 373.—WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 34.
Sericoris caesialbana ZELLER, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 285.—FERNALD, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 34.

Sericoris bipartitana DAVIS, Bull. Michigan Agr. Sta., no. 102, 1893, p. 30.
Olethreutes bipartitana FERNALD, in Dyar List N. Amer. Lepid., no. 5071, 1903.—FORBES, Memoir 68, Cornell Univ. Agr. Exp. Sta. 1924, p. 451.
Olethreutes similisana FERNALD, in Dyar List N. Amer. Lepid., no. 5072, 1903.
Olethreutes dilutifuscana KEARFOTT (not Walsingham), Can. Ent., vol. 37, 1905, p. 208.
Argyroploce bipartitana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6869, 1917.
Argyroploce similisana BARNES and MCDUNNOUGH, Check List Lepid, Bor. Amer., no. 6870, 1917.

Walsingham referred *similisana* Walker to the synonymy in 1879; but in this was not followed by our cataloguers, why I do not know as there does not seem to be any reason for doubting the correctness of his reference. From the description and figure *dilutifuscana* Walsingham also appears to be a synonym or variety of *bipartitana*. Zeller's *caesialbana* is certainly equal, as Fernald had it, to *bipartitana*. There are cotypes of the former in the National Collection which agree in every detail with Clemens' type in Philadelphia. In general appearance *bipartitana* Clemens and *glaciana* Möschler are very similar and easily confused. Both species are variable in the extent and intensity of the dark markings in the postmedian area of the fore wing. The characters given in the key will help to distinguish most specimens; but the only sure way to separate the two is by their genitalia which are quite different.

Male and female genitalia figured from specimens in National Collection from East River, Conn. (C. R. Ely, July 13, 1907, male), and Sebec Lake, Me. (June, female).

Bursa of female with signum a scobinate patch.

Distribution.—Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Montana, Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, Alaska.

Alar expanse.—15.5–20 mm.

Types.—In Academy Natural Science, Philadelphia (*bipartitana*); British Museum (*similisana*); Museum Comparative Zoology (*caesialbana*).

Type localities.—Massachusetts (*bipartitana*, *caesialbana*): St. Martins Falls, Albany River, Hudsons Bay (*similisana*).

Food plant.—Celery.

19. OLETHREUTES DILUTIFUSCANA (Walsingham)

Sericoris dilutifuscana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 33.
Olethreutes dilutifuscana FERNALD, in Dyar List N. Amer. Lepid., no. 5070, 1903; not Kearfott, Can. Ent., vol. 37, 1905, p. 208.
Argyroploce dilutifuscana BARNES and MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6868, 1917.

Specimens from Saskatchewan determined by Kearfott as this species are *bipartitana*. I am inclined to agree and to refer *dilutifuscana* to the synonymy, except for the fact that Walsingham has taken particular pains to distinguish his species from *bipartitana*. The variability of the latter, however, invalidate the characters he uses for separation. On the other hand the type locality of *dilutifuscana* seems to be somewhat outside the known range of *bipartitana*.

There is a specimen from Walsingham in the Fernald Collection labeled "Type" which equals *urticana* Hübner. I have some doubts, however, that this supposed paratype is correctly identified, and until the genitalia of the actual type can be examined it were better to keep the Walsingham name out of synonymy.

Alar expanse.—16 mm.

Type.—In British Museum.

Type locality.—Southern Oregon.

20. OLETHREUTES GLACIANA (Möschler)

(Figs. 248, 432)

Sericoris glaciana Möschler, Wien, Ent. Monat., vol. 14, 1860, p. 380.

Penthina dealbana Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 374.

Sericoris fuscalbana Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 284.

Sericoris dealbana Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 34; Trans. Ent. Soc. London, 1884, p. 136.

Olethreutes fuscalbana Fernald, in Dyar List N. Amer. Lepid., no. 5067, 1903.—Kearfott, Can. Ent., vol. 37, 1905, p. 208; Ins. New Jersey, 1910, p. 540.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 451

Olethreutes glaciana Fernald, in Dyar List N. Amer. Lepid., no. 5068, 1903.—Kearfott, Can. Ent., vol. 37, 1905, p. 208.

Olethreutes dealbana Fernald, in Dyar List N. Amer. Lepid., no. 5069, 1903.

Argyroploce fuscalbana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6865, 1917.

Argyroploce glaciana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6866, 1917.

Argyroploce dealbana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6867, 1917.

Argyroploce castorana McDunnough, Can. Ent., vol. 54, 1922. p. 54.

I do not think there can be any reasonable doubt of the above synonymy. We have a paratype of *fuscalbana* in the National Collection, and it agrees in genitalia with *castorana* and what Fernald and others have identified as *glaciana*. Walker's *dealbana* I am placing here on the strength of Walsingham's description and figure and Knight's very careful figure in the American Museum. Kearfott usually determined specimens of *urticana* as *dealbana*. This I

think is certainly an error. He also had specimens of *glaciana* as *mengelana* and *inquietana*, obvious misidentifications.

Male and female genitalia figured from specimens in National Collection from Massachusetts (paratype of *fuscalbana*, male) and Hot Springs, Washington (female).

Bursa of female with signum a somewhat impressed scobinate patch.

Distribution.—North Carolina, Pennsylvania, New Jersey, Massachusetts, New Hampshire, Nova Scotia, Labrador, Ontario, Alberta, Saskatchewan, Manitoba, British Columbia, Washington, Colorado, Arizona.

Alar expanse.—12–19.5 mm.

Types.—In collection Staudinger? (*glaciana*); British Museum (*dealbana*, *fuscalbana*); Canadian National Collection (*castorana*).

Type localities.—Labrador (*glaciana*); "North America" (*dealbana*); Ohio (*fuscalbana*); Nordegg, Alberta (*castorana*).

21. OLETHREUTES NORDEGGANA (McDunnough)

(Figs. 255, 437)

Argyroploce nordeggana McDunnough, Can. Ent., vol. 54, 1922, p. 46.

A distinct species, so far represented only by the type material in the Canadian National Collection.

Male and female genitalia figured from type and paratype.

Bursa of female with signum a slight, impressed, scobinate patch.

Alar expanse.—20 mm.

Type.—In Canadian National Collection.

Type locality.—Nordegg, Alberta.

OLETHREUTES RIVULANA (Scopoli)

This European name should be dropped from our lists as the species probably does not occur in North America. Nothing that I have seen under the name in the collections agrees with European specimens.

22. OLETHREUTES SCHULZIANA (Fabricius)

(Fig. 440)

Pyralis schulziana Fabricius, Gen. Ins., 1777, p. 293.

Orthotaenia bentleyana Curtis, Appendix, Ross Second Arctic Voyage, 1835, p. 74.

Olethreutes schulziana Staudinger and Rebel, Cat. Lepid., vol. 2, no. 1912, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5076, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

Argyroploce schulziana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6874, 1917.

Phiaris schulziana Pierce and Metcalfe, Genitalia Brit. Tort., 1922, p. 50, pl. 17.

In genitalia *schulziana* and *intermistana* are very similar. The European species is somewhat larger and often more reddish; but otherwise I can see no real difference. The question of synonymy, however, will have to remain in abeyance until a typical specimen can be recovered from Arctic America. In the Canadian National Collection there are a number of specimens from Quebec, Alberta, and Quebec, Labrador under the name. They are quite dark however (blackish rather than red) and very variable. I have little doubt but that they are color or local varieties of *schulziana*.

Male genitalia figured from European specimen in National Collection.

Alar expanse.—18–25 mm.

Type.—Location unknown.

Type locality.—Europe.

Food plant.—Pinus sylvestris (in Europe).

23. OLETHREUTES INTERMISTANA (Clemens)

(Figs. 258, 441)

Penthina turfosana Möschler (not Herrich-Schaefer) Ent. Monat., vol. 8, 1864, p. 199.

Mixodia ? intermistana Clemens, Proc. Ent. Soc. Philadelphia, vol. 5, 1865, p. 140.

Penthina tessellana Packard, Proc. Boston Soc. Nat. Hist., vol. 11, 1867, p. 58.

Olethreutes intermistana Fernald, in Dyar List N. Amer. Lepid., no. 5028, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

Olethreutes turfosana Fernald, in Dyar List N. Amer. Lepid., no. 5065, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

Argyroploce intermistana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6813, 1917.

Argyroploce turfosana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6863, 1917.

In size, color, and general appearance *intermistana* and *turfosana* are much alike. The two differ genitalically in the length of the spined lower margin of the harpe, and there is no doubt of their being distinct species. It is my opinion that the European species does not occur in our fauna, and that what Möschler took for it was a specimen of *intermistana*.

Male genitalia figured from specimen in Canadian Collection from Labrador; female from specimen in National Collection from Mount Washington, N. H. ("Aug. 1–7").

Bursa of female with signum a week scobinate patch.

Distribution.—Labrador, Alberta, New Hampshire.

Alar expanse.—16–20 mm.

Types.—In Academy Natural Sciences Philadelphia (*intermistana*); Museum Comparative Zoology (*tessellana*).

Type locality.—Labrador (*intermistana*, *tessellana*).

24. OLETHREUTES SEPTENTRIONANA (Curtis)

(Fig. 443)

Orthotænia septentrionana Curtis, Ross Second Voyage N. W. Passage, Appendix, 1831, p. 74.—Walsingham, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 35.

? *Sciaphila primariana* Walker, Cat. Lepid. Heter. Brit. Mus., vol. 28, 1863, p. 336.

? *Penthina fulvifrontana* Packard, Proc. Boston Soc. Nat. Hist., vol. 11, 1867, p. 59.

Olethreutes septentrionana Fernand, in Dyar List N. Amer., Lepid., no. 5029, 1903.—Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6814, 1917.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.

There is considerable doubt about the correctness of the above synonymy. From Knight's figure in the American Museum it does not seem that *primariana* can be the same as *fulvifrontana*; and it is also a question whether either is equivalent to *septentrionana*. Until some one can examine the genitalia of Walkers' and Curtis' types the synonymy may as well stand as it is.

O. fulvifrontana has genitalia similar to those of *inquietana*, except that the spining of cucullus fuses more completely with that at the apex of the extended sacculus, and that there is less of a break between cucullus and extended sacculus than in the latter species. The fore wing pattern reminds strongly of that of some specimens of *schulziana*. Packard's species, however, lacks any sign of a round white dot at end of cell; the basal patch is well marked, strongly angulate outwardly; the median dark band narrow on costa, broad on dorsum and fused with subtornal spot, and has only one projecting tooth and that from middle; the apical dark markings are somewhat variable, being different in type and paratype and even on the right and left fore wings of the type; the dark markings are a rick brown shaded with black, and the pale antemedian and postmedian areas a whitish ochreous.

Besides the type and paratype at Cambridge there is a broken and faded paratype (female without abdomen) in the Academy of Natural Sciences at Philadelphia, and two small Labrador specimens from the Fernald collection in the National Museum.

Male genitalia figured from type (*fulvifrontana*).

Alar expanse.—14–15 mm.

Types.—? (*septentrionana*); in British Museum (*primariana*); Museum Comparative Zoology (*fulvifrontana*).

Type localities.—Arctic American (*septentrionana*, *primariana*); Sloop Harbor, Labrador (*fulvifrontana*).

25. OLETHREUTES INQUIETANA (Walker)

(Figs. 252, 442)

Paedisca inquietana WALKER, Cat. Lepid. Heter. Brit. Mus. vol. 28, 1863, p. 378.

Sericoris inquietana WALSINGHAM, Illus. Lepid. Heter. Brit. Mus., vol. 4, 1879, p. 35.

Penthina septentrionana MÖSCHLER, Stett. Ent. Zeit., vol. 44, 1883, p. 124.

Olethreutes boreana REBEL, Stauding and Rebel, Cat. Lepid., vol. 2, no. 1913, 1901.

Olethreutes inquietana FERNALD, in Dyar List N. Amer. Lepid., no. 5074, 1903.

Argyroploce inquietana BARNES AND MCDUNNOUGH, Check List Lepid. Bor. Amer., no. 6872, 1917.

McDunnough has suggested the synonymy of *boreana* and *inquietana*. In this he is most probably correct.

We have a single male in the National Collection (without locality label) which agrees with specimens in the Canadian National Collection from Greenland and Northwest Territory and with Knight's figure in the American Museum. There are also several specimens from Greenland in the Barnes collection.

Genitalia figured from specimens in National Collection (male) and collection Barnes (female).

Bursa of female without signum.

Alar expanse.—24–26 mm.

Types.—In British Museum (*inquietana*); collection Staudinger? (*boreana*).

Type localities.—"Arctic America" (*inquietana*); Labrador (*boreana*).

26. OLETHREUTES BOWMANANA (McDunnough)

(Fig. 447)

Argyroploce bowmanana MCDUNNOUGH, Can. Ent., vol. 55, 1923, p. 165.

Similar to *intermistana* in pattern and color, but with narrower wings. Can be recognized by the strongly contrasted shining white spot at upper outer angle of cell on fore wing.

Male genitalia of type figured.

In addition to the material in the Canadian National Collection there is a male from Moraine Lake, Alberta ("7–VIII–1923") in the United States National Museum donated by Dr. McDunnough.

Alar expanse.—15 mm.

Type.—In Canadian National Collection.

Type locality.—Nordegg, Alberta.

27. OLETHREUTES MENGELANA (Fernald)

(Figs. 251, 446)

Sericoris mengelana Fernald, Ent. News., vol. 5, 1894, p. 131.
Penthina groenlandicana Bang-Haas, Vid. Medd., 1896, p. 190.
Olethreutes groenlandicana Staudinger and Rebel, Cat. Lepid., vol 2, no. 1884, 1901.
Olethreutes mengelena Staudinger and Rebel, Cat. Lepid., vol. 2, no. 1885, 1901.—Fernald, in Dyar List N. Amer. Lepid., no. 5059, 1903.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 452.
Argyroploce groenlandicana Kennel, Palaeark. Tort., Lfg. 3, Zoologica, vol. 21, Heft 54, 1913, p. 377.
Argyroploce mengelana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6840, 1917.—(?) Blackmore, Report Proc. Mus. Nat. Hist. British Columbia, 1921, pl. 4, p. 33.

There is an authentic male of *groenlandicana* from Greenland in the Barnes collection, received from Bang-Haas. It agrees with Fernald's type of *mengelana.* Superficially it is much like the *Aphania* of the *tertiana-affícticia* group; but is structurally quite different and a good *Olethreutes.* The Barnes collection also has two other males and a female, all from Greenland.

The male genitalia of this Band-Haas type is figured. Female genitalia figured from specimen in National Collection, also from Greenland.

Aside from the above (and the Fernald types), I have seen one other example, in poor condition, in the American Museum. The other specimens Kearfott had under the name are *glaciana.*

Alar expanse.—16–20 mm.

Types.—In National Collection (*mengelana*); collection Staudinger (*groenlandicana*).

Type locality.—Greenland.

28. OLETHREUTES COSTIMACULANA (Fernald)

(Figs. 246, 421)

Penthina costimaculana Fernald, Trans. Amer. Ent. Soc., vol. 10, 1882, p. 70.
Olethreutes costimaculana Fernald, in Dyar List N. Amer. Lepid., no. 5046, 1903.—Forbes, Memoir 68 Cornell Univ. Agr. Exp. Sta., 1924, p. 456.
Argyroploce costimaculana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6846, 1917.

This species fits rather badly in the genus. In many ways—especially on characters of the male genitalia—it fits better in *Hedia;* but the absence of signa in the female bursa seems to forbid such reference. Veins 8 and 9 of fore wing are more widely separated, 2 is more bent than in other *Olethreutes*, and the spining on

the uncus of the male genitalia is a little too strong, more like that of typical *Hedia*.

Male and female genitalia figured from specimens in National Collection from Meach Lake, Quebec (C. H. Young, "25-5-03," male), and Mer Bleue, Ottawa, Ontario ("25-5-03" female).

Bursa of female without signum.

Distribution.—Maine, Ontario, Quebec, Manitoba, Alberta, Labrador.

Alar expanse.—13–14 mm.

Type.—In National Collection.

Type locality.—Maine.

OLETHREUTES ROSEOMACULANA (Herrich-Schaefer)

Is probably wrongly credited to North America and should be omitted from our lists. Fernald's *costimaculana* is very similar in pattern and color and is very likely what Möschler had from Labrador. It averages a trifle smaller than typical specimens of *roseomaculana*, but could easily be mistaken for that species.

29. OLETHREUTES DEVOTANA Kearfott

(Figs. 250, 420)

Olethreutes devotana Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 16.

Argyroploce devotana Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6848, 1917.

This species also, like *costimaculana*, would seem rather to belong in *Hedia* than *Olethreutes*. The uncus is rather strongly spined; but the bursa shows no trace of signa.

Represented by the type material in the American Museum and National Collections, and by specimens in the Barnes and National Collections from Florida.

Male genitalia figured from type, female from paratype in Collection Barnes from Hastings, Fla. ("VI–8").

Alar expanse.—14–15 mm.

Type.—In American Museum.

Type locality.—"Ch. Harbor, Fla."

30. OLETHREUTES BUCKELLANA (McDunnough)

(Fig. 448)

Argyroploce buckellana McDunnough, Can. Ent., vol. 54, 1922, p. 43.

So far represented only by the Canadian Museum material, type and one other male from the type locality. Easily recognized by the male genitalia which has a short stiff spur projecting from sac-

culus near incurvation of neck. This is somewhat obscured in the photograph by a slight tuft of hair.

Male genitalia of type figured.

Alar expanse.—15 mm.

Type.—In Canadian National Collection.

Type locality.—Salmon Arm, British Columbia.

31. OLETHREUTES BUCKELLANA ALBIDULA, new variety

(Fig. 253)

Similar to *buckellana* but with antemedian and post median areas of fore wing distinctly white.

Palpus white; terminal joint and end of second joint black. Face white, with projecting scales above black. Head black with a scattering of ferruginous and whitish scales. Thorax blackish fuscous, faintly banded with white. Fore wing with dark areas olivaceous fuscous faintly spotted with black; median band of nearly uniform width throughout and including subtornal patch, oblique, outer margin somewhat irregular, two small black dots in middle; subapical bar weak, narrow, curved; a faint dark shading at apex; termen ferruginous above tornus; cilia whitish, shaded with ferruginous b yond base. Hind wing pale smoky fuscous; cilia white with a dark basal band. Underside of hind wing considerably paler than underside of fore wing, whitish.

Male genitalia as in *buckellana.*

Female genitalia figured from paratype in National Collection from the type locality.

Bursa of female without signum.

Alar expanse.—15.5–17 mm.

Type.—In collection Barnes.

Paratypes.—Cat. No. 28042, U.S.N.M.; also in American Museum, Barnes and Canadian National coll ctions.

Type locality.—Inyo County, Calif.

Described from male type, 7 male and 4 female paratypes from the type locality ("June 5–30–22," "June 1–15," "June 15–30, 1922," O. G. Poling); two male paratypes from Elk Point, S. Dak. (Aug. 1913, C. N. Ainslie); and one male paratype from Saskatoon, Saskatchewan ("21–VII–1923," Kenneth M. King).

19. EVORA, new genus

(Figs. 55, 201)

Genotype.—*Euchromia hemidesma* Zeller (North America).

Thorax with posterior tuft.

Fore wing smooth; termen straight; 12 veins, all separate; 8 and 9 separate; upper internal vein of cell from between 10–11; 3, 4, and 5 not approximate at termen; 2 from cell beyond ¾, straight.

Hind wing with 8 veins; 6 and 7 approximate toward base; 3 and 4 connate; 5 approximate to 4; termen concave below apex; in male a chitinous ridge on inner margin.

Hind tibia of male with yellow hair pencile.

Male genitalia with harpe elongate; broadened at base of cucullus; outer surface unspined; cucullus short, strongly spined; spine clusters *Spc*,[1] *Spc*[2] strongly developed; sacculus weakly haired toward base. Uncus short, broad, rounded, heavily spined beneath. Socii short, flexible, hairy. Gnathos normal, a simple band with weakly chitinized subanal plate. Aedoeagus fairly long, rather stout, straight; cornuti absent.

Female genitalia without signum. Ductus bursae moderately long, unchitinized except at genital opening.

A derivative of *Olethreutes*. Contains only the one North American species.

The position of vein 2 of fore wing would seem to place it in the *Phaloniidae;* but the typically olethreutine genitalia forbid. This is the only olethreutid as far as I know which shows such a character.

EVORA HEMIDESMA (Zeller)

(Figs. 55, 201, 411)

Euchromia hemidesma Zeller, Verh. Zool.-bot. Ges. Wien, vol. 25, 1875, p. 261.
Olethreutes hemidesma Fernald, in Dyar List N. Amer. Lepid., no. 5041, 1903.—Kearfott, Can. Ent., vol. 37, 1907, p. 207.—Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.
Argyroploce hemidesma Barnes and McDunnough, Check List Lepid. Bor. Amer., no. 6856, 1917.

A reddish brown species with narrow, darker median band on fore wing; somewhat resembling dark specimens of *Melissopus latiffereanus* Walsingham.

Male and female genitalia figured from specimens in National Collection from Cartwright, Manitoba (E. F. Heath, male) and Kentucky (August Busck, August, female).

Distribution.—Maine, New Hampshire, Massachusetts, Connecticut, New Jersey, Pennsylvania, Virginia, Kentucky, Illinois, Iowa, Manitoba, Ontario.

Alar expanse.—13–17 mm.

Type.—In British Museum.

Type locality.—Massachusetts.

Food plants.—*Spiraea tormentosa*, *Solidago* (larvae in flower heads).

SPECIES REFERABLE ELSEWHERE

Aphelia? inquadrana Walsingham, Trans. Ent. Soc. London, 1884, p 134.—Fernald, in Dyar List N. Amer. Lepid., no. 5008, 1903 (*Bactra*).—Barnes and McDunnough, Check List Lepid. Bor. Amer., no 6791, 1917 (*Bactra*).

A narrow-winged *Eucosma* similar in pattern to *pulveratana* Walsingham, which species it precedes in our arrangement. The resemblance to *Bactra* is only superficial, and there is a well-marked costal fold which Walsingham overlooked. A series of males from Sells Post Office, Pima County, Arizona (April–May, 1923), has been received recently through Dr. William Barnes. These are the first authentic specimens I have seen in any American collection.

The following species now listed with the Olethreutinae are referable to the Tortricidae. The numbers before each are those of the Barnes and McDunnough list.

6820—*Olethreutes wellingtoniana* Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 13.

6845—*Olethreutes gogana* Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 8.

6875—*Olethreutes provana* Kearfott, Trans. Amer. Ent. Soc., vol. 33, 1907, p. 16.

EXPLANATION OF PLATES

The drawings accompanying this paper were made under the author's supervision by Miss Eleanor Armstrong and Mr. Harry Bradford, of the Bureau of Entomology. The photographs were taken by Mr. J. G. Pratt, of the Bureau of Entomology.

Terms used in description of male genital organs:

Dsp=spines arising from outer surface of harpe.

Gn=Gnathos.

ScSp=spines on base of sacculus.

Si=socii.

Spc^1 and *Spc*^{2}=heavy spine clusters on or near sacculus of harpe.

U=Uncus.

X=spine group on arch of sacculus (in *Exartema*).

PLATE 1

Structural characters in Laspeyresiinae

FIG. 1. Metathoracic leg of *Gymnandrosoma punctidiscanum* Dyar, Male.
2. Metathoracic leg of *Melissopus latiferreanus* (Walsingham), Male.
3. Partially denuded male hind wing of *G. punctidiscanum*, showing venation, pocket-like development of inner margin, and sex scaling.
4. Hind wing venation of *Ricula maculana* (Fernald), Male.
5. Abdomen of *G. punctidiscanum* (male), dorsal view showing pair of hair tufts from caudal edge of second segment.
6. Hind wing venation (male) of *Hemimene populana* (Fabricius).
7. Caudal segments of denuded male abdomen of *Grapholitha fana* (Kearfott), showing hair tufts from sternite of eighth segment.
8. Hind wing venation (male) of *Dichrorampha kana* (Busck).
9. Denuded hind wing (male) of *M. latiferreanus*, showing venation, thickening at inner margin, and pocket inclosing pecten.
10. Denuded hind wing (male) of *Ecdytolopha insiticiana* Zeller, showing venation and pocket and hair pencile on vein 1 [a].

PLATE 2

Structural and pattern characters in Olethreutinae

FIG. 11. Inside view of metathoracic leg of male *Exartema* showing hair pencile from base of tibia.
12. Fore wing venation of *Polychrosis viteana* (Clemens).
13. Fore wing venation of *Olethreutes arcuella* (Clerck).
14. Fore wing of *Exartema electrofuscum* Heinrich, showing characteristic Olethreutid pattern: *B*=basal patch; *M*=median band; *St*=subtornal spot; *Sa*=subapical bar.
15. Anterior segment of denuded male abdomen of *Polychrosis cypripediana* Forbes, showing pockets (*x*) of papilliform hairs on basal segment.
16. Metathoracic leg (male) of *Phaecasiophora confixana* (Walker).
17. Head and thorax of *Sciaphila duplex* (Walsingham); side view showing posterior thoracic tuft (*TT*).
18. Denuded male hind wing of *Exartema concinnanum* (Clemens) showing venation and anal lobe.
19. Fore wing venation of *Polychrosis botrana* (Schiffermüller).
20. Hind wing venation of *P. botrana*.
21. Fore wing venation of *Episimus transferranus* (Walker).
22. Fore wing of *E. transferranus*, showing characteristic *Episimus* pattern.

PLATE 3

Male genitalia (Laspeyresiinae)

FIG. 23. *Satronia tantilla* Heinrich.
24. *Goditha bumeliana* Heinrich.
25. *Ricula maculana* (Fernald).
26. *Ethelgoda taxanana* (Walsingham).
27. *Hemimene populana* (Fabricius).

PLATE 4

Male genitalia (Laspeyresiinae)

FIG. 28. *Dichrorampha plumbagana* (Treitschke).
29. *Sereda lautana* (Clemens).
30. *Ofatulena duodecemstriata* (Walsingham).

PLATE 5

Male genitalia (Laspeyresiinae)

FIG. 31. Tegumen and aedoeagus of *Melissopus latiferreanus* (Walsingham); variety *G*.
32. Tegumen and aedoeagus of *M. latiferreanus;* variety *B*.
33. Tegumen and aedoeagus of *M. latiferreanus;* variety *C*.
34. Tegumen and aedoeagus of *M. latiferreanus;* variety *D*.
35. Tegumen and aedoeagus of *M. latiferreanus;* variety *F*.
36. *Melissopus latiferreanus* (Walsingham); variety *A*.
37. *Carpocapsa pomonella* (Linnaeus).
38. *Gymnandrosoma punctidiscanum* Dyar.

PLATE 6

Male genitalia (Olethreutinae)

FIG. 39. *Episimus transferranus* (Walker).
40. *Olethreutes arcuella* (Clerck).

PLATE 7

Male genitalia (Olethreutinae)

FIG. 41. *Polychrosis botrana* (Schiffermüller).
42. *Exartema nitidanum* Clemens.

PLATE 8

Male genitalia (Olethreutinae)

FIG. 43. *Badebecia urticana* (Hübner).
44. *Bactra lanceolana* (Hübner); right harpe.
45. *Bactra furfurana* (Haworth).
46. *Bactra verutana albipuncta* Heinrich; right harpe.
47. *Bactra verutana verutana* Zeller; right harpe.
48. *Endothenia gentianana* (Hübner).
49. *Bactra verutana chrysea* Heinrich; right harpe.

PLATE 9

Male genitalia (Olethreutinae)

FIG. 50. *Taniva albolineana* (Kearfott).
51. *Sciaphila duplex* (Walsingham).

PLATE 10

Male genitalia (Olethreutinae)

FIG. 52. *Hulda impudens* (Walsingham).
53. *Tia vulgana* (McDunnough).
54. *Aphania scriptana* (Hübner).

PLATE 11

Male genitalia (Olethreutinae)

FIG. 55. *Evora hemidesma* (Zeller).
56. *Esia approximana* (Heinrich).
57. *Eccopsis wahlbergiana* Zeller.

PLATE 12

Male genitalia (Olethreutinae)

FIG. 58. *Ahmosia galbinea* Heinrich.
59. *Zomaria interruptolineana* (Fernald).
60. *Eumarozia malachitana* (Zeller).

PLATE 13

Male genitalia (Olethreutinae)

FIG. 61. *Phaecasiophora confixana* (Walker).
62. *Hedia salicella* (Linnaeus).

PLATE 14

Right harpes of male genitalia (*Exartema*)

FIG. 63. *Exartema zellerianum* (Fernald).
64. *Exartema nitidanum* Clemens.
65. *Exartema foedanum* (Clemens).
66. *Exartema olivaceanum* (Fernald).
67. *Exartema cornanum* Heinrich.
68. *Exartema subnubilum* Heinrich.
69. *Exartema inornatanum* Clemens.
70. *Exartema monetiferanum* Riley.
71. *Exartema punctanum* Walsingham.

PLATE 15

Right harpes of male genitalia (*Exartema*)

FIG. 72. *Exartema mediopartitum* Heinrich.
73. *Exartema exoletum* Zeller.
74. *Exartema tenebricum* Heinrich.
75. *Exartema electrofuscum* Heinrich.
76. *Exartema footianum* (Fernald).
77. *Exartema atrodentanum* (Fernald).
78. *Exartema furfuranum* McDunnough.
79. *Exartema rusticanum* McDunnough.
80. *Exartema clavanum* (Walker).

PLATE 16

Right harpes of male genitalia (*Exartema*)

FIG. 81. *Exartema trepidulum* Heinrich.
82. *Exartema malanum* (Fernald).
83. *Exartema melanomesum* Heinrich.
84. *Exartema corylanum* (Fernald).
85. *Exartema submissanum* McDunnough.
86. *Exartema nigranum* Heinrich.
87. *Exartema quadrifidum* Zeller.
88. *Exartema hippocastanum* Kearfott.

PLATE 17

Right harpes of male genitalia (*Exartema*)

FIG. 89. *Exartema valdanum* McDunnough.
90. *Exartema permundanum* Clemens.
91. *Exartema merrickanum* Kearfott.
92. *Exartema fagigemmeanum* Chambers.
93. *Exartema sciotanum* Heinrich.
94. *Exartema ferrugineanum* Riley.
95. *Exartema sericoranum* Walsingham.
96. *Exartema ochrosuffusanum* Heinrich.
97. *Exartema tilianum* Heinrich.

PLATE 18

Right harpes of male genitalia (*Exartema*).

FIG. 98. *Exartema appendiceum* Zeller.
99. *Exartema concinnanum* Clemens.
100. *Exartema ferriferanum* (Walker).
101. *Exartema exaeresimum* Heinrich.
102. *Exartema fasciatanum* Clemens.
103. *Exartema troglodanum* McDunnough.

PLATE 19

Female genitalia (*Dichrorampha*, *Ricula*)

FIG. 104. *Dichrorampha bittana* (Busck).
105. *Dichrorampha leopardana* (Busck).
106. *Ricula maculana* (Fernald).
107. *Dichrorampha sedatana* (Busck).
108. *Dichrorampha incanana* (Clemens).
109. *Dichrorampha radicicolana* (Walsingham).
110. *Dichrorampha dana* (Kearfott).
111. *Dichrorampha capitana* (Busck).

PLATE 20

Female genitalia (*Melissopus, Talponia, Ecdytolopha, Hemimene*)

FIG. 112. *Melissopus latiferreanus* (Walsingham) ; variety *E.*
113. *Melissopus latiferreanus* (Walsingham) ; variety *A.*
114. *Talponia plummeriana* (Busck).
115. *Ecdytolopha insiticiana* Zeller.
116. *Hemimene felicitana* (Heinrich).
117. *Ecdytolopha mana* (Kearfott).

PLATE 21

Female genitalia (*Sereda, Ofatulena, Gymnandrosoma, Ethelgoda*)

FIG. 118. *Sereda lautana* (Clemens).
119. *Ofatulena duodecemstiata* (Walsingham).
120. *Ofatulena luminosa* Heinrich.
121. *Gymnandrosoma punctidiscanum* Dyar.
122. *Ethelgoda texanana* (Walsingham).
123. *Gymnandrosoma desotana* Heinrich.

PLATE 22

Female genitalia (*Grapholitha*)

FIG. 124. *Grapholitha eclipsana* Zeller.
125. *Grapholitha caeruleana* Walsingham.
126. *Grapholitha fana* (Kearfott).
127. *Grapholitha angleseana* (Kearfott).
128. *Grapholitha lunatana* Walsingham.
129. *Grapholitha molesta* (Busck).
130. *Grapholitha prunivora* (Walsh).
131. *Grapholitha vitrana* Walsingham.
132. *Grapholitha packardi* Zeller.
133. *Grapholitha conversana* Walsingham.
134. *Grapholitha imitativa* Heinrich.

PLATE 23

Female genitalia (*Grapholitha, Laspeyresia*)

FIG. 135. *Grapholitha dyarana* (Kearfott).
136. *Grapholitha tristrigana* (Clemens).
137. *Grapholitha lana* (Kearfott).
138. *Laspeyresia youngana* (Kearfott).
139. *Grapholitha interstinctana* (Clemens).
140. *Laspeyresia nigricana* (Stephens).
141. *Laspeyresia crotella* (Heinrich).
142. *Laspeyresia flexiloqua* Heinrich.

PLATE 24

Female genitalia (*Laspeyresia*)

FIG. 143. *Laspeyresia garacana* (Kearfott).
144. *Laspeyresia prosperana* (Kearfott).
145. *Laspeyresia populana* Busck.
146. *Laspeyresia caryana* (Fitch).
147. *Laspeyresia albimaculana* (Fernald).
148. *Laspeyresia ninana* (Dyar).
149. *Laspeyresia flavicollis* (Walsingham).
150. *Laspeyresia membrosa* Heinrich.

PLATE 25

Female genitalia (*Laspeyresia*)

FIG. 151. *Laspeyresia bracteatana cornutana* (Dyar).
152. *Laspeyresia candana* Forbes.
153. *Laspeyresia rana* Forbes.
154. *Laspeyresia cupressana* (Kearfott).
155. *Laspeyresia laricana* Busck.
156. *Laspeyresia tana* (Kearfott).
157. *Laspeyresia leucobasis* Busck.
158. *Laspeyresia americana* (Walsingham).

PLATE 26

Female genitalia (*Laspeyresia, Hedulia*)

FIG. 159. *Laspeyresia toreuta* (Grote).
160. *Laspeyresia miscitata* Heinrich.
161. *Laspeyresia ingens* Heinrich.
162. *Hedulia injectiva* Heinrich.
163. *Laspeyresia piperana* (Kearfott).

PLATE 27

Female genitalia (*Laspeyresia, Carpocapsa*)

FIG. 164. *Laspeyresia obnisa* Heinrich.
165. *Laspeyresia inopiosa* Heinrich.
166. *Laspeyresia gallaesaliciana* (Riley).
167. *Laspeyresia colorana* (Kearfott).
168. *Laspeyresia lautiuscula* Heinrich.
169. *Carpocapsa pomonella* (Linnaeus).

PLATE 28

Female genitalia (*Bactra*)

FIG. 170. *Bactra furfurana* (Haworth).
171. *Bactra verutana* Zeller.
172. *Bactra priapeia* Heinrich.
173. *Bactra maiorina* Heinrich.
174. *Bactra sinistra* Heinrich.

PLATE 29

Female genitalia (*Polychrosis*)

FIG. 175. *Polychrosis liriodendrana* Kearfott.
176. *Polychrosis rhoifructana* Kearfott.
177. *Polychrosis vernoniana* Kearfott.
178. *Polychrosis spiraeifoliana* Heinrich.
179. *Polychrosis slingerlandana* Kearfott.
180. *Polychrosis aemulana* Heinrich.
181. *Polychrosis carduana* Busck.
182. *Polychrosis viteana* (Clemens).

PLATE 30

Female genitalia (*Polychrosis, Episimus, Ahmosia*)

FIG. 183. *Episimus argutanus* (Clemens).
184. *Ahmosia aspasiana* (McDunnough).
185. *Polychrosis cyclopiana* Heinrich.
186. *Ahmosia galbinea* Heinrich.
187. *Episimus tyrius* Heinrich.

PLATE 31

Female genitalia (*Taniva, Endothenia*)

FIG. 188. *Endothenia hebesana* (Walker).
189. *Taniva albolineana* (Kearfott).
190. *Endothenia montanana* (Kearfott).
191. *Endothenia melanosticta* (Walsingham).
192. *Endothenia antiquana nubilana* (Clemens).

PLATE 32

Female genitalia (*Endothenia, Hulda, Tia, Eumarozia*)

FIG. 193. *Hulda impudens* (Walsingham).
194. *Eumarozia malachitana* (Zeller).
195. *Tia vulgana* (McDunnough).
196. *Endothenia sordulenta* Heinrich.
197. *Endothenia rubipuncta* (Kearfott).

PLATE 33

Female genitalia (*Zomaria, Evora, Esia*)

FIG. 198. *Zomaria andromedana* (Barnes and McDunnough).
199. *Zomaria interruptolineana* (Fernald).
200. *Zomaria rosaochreana* (Kearfott).
201. *Evora hemidesma* (Zeller).
202. *Esia approximana* (Heinrich).

PLATE 34

Female genitalia (*Exartema*)

FIG. 203. *Exartema zellerianum* (Fernald).
204. *Exartema nitidanum* Clemens.
205. *Exartema footianum* (Fernald).
206. *Exartema versicoloranum* Clemens.
207. *Exartema sciotanum* Heinrich.
208. *Exartema brunneopurpuratum* Heinrich.

PLATE 35

Female genitalia (*Exartema*)

FIG. 209. *Exartema foedanum* (Clemens).
210. *Exartema clavanum* (Walker).
211. *Exartema olivaceanum* (Fernald).
212. *Exartema punctanum* Walsingham.
213. *Exartema inornatanum* Clemens.
214. *Exartema tilianum* Heinrich.
215. *Exartema electrofuscum* Heinrich.
216. *Exartema subnubilum* Heinrich.
217. *Exartema atrodentanum* (Fernald).

PLATE 36

Female genitalia (*Exartema*)

FIG. 218. *Exartema malanum* (Fernald).
219. *Exartema troglodanum* McDunnough.
220. *Exartema ferriferanum* (Walker).
221. *Exartema monetiferanum* Riley.
222. *Exartema merrickanum* Kearfott.
223. *Exartema ferrugineanum* Riley.
224. *Exartema hippocastanum* Kearfott.
225. *Exartema permundanum* Clemens.
226. *Exartema quadrifidum* Zeller.

PLATE 37

Female genitalia (*Exartema, Phaecasiophora*)

FIG. 227. *Exartema exoletum* Zeller.
228. *Exartema corylanum* (Fernald).
229. *Exartema concinnanum* (Clemens).
230. *Exartema appendiceum* Zeller.
231. *Phaecasiophora niveiguttana* Grote.
232. *Exartema fasciatanum* Clemens.
233. *Phaecasiophora confixana* (Walker).

PLATE 38

Female genitalia (*Olethreutes*)

FIG. 234. *Olethreutes osmundana* (Fernald).
235. *Olethreutes agilana* (Clemens).
236. *Olethreutes griseoalbana* (Walsingham).
237. *Olethreutes albiciliana* (Fernald).
238. *Olethreutes auricapitana* (Walsingham).

PLATE 39

Female genitalia (*Olethreutes*)

FIG. 239. *Olethreutes astrologana* (Zeller).
240. *Olethreutes constellatana* (Zeller).
241. *Olethreutes galaxana* Kearfott.
242. *Olethreutes coruscana* (Clemens).
243. *Olethreutes carolana* (McDunnough).

PLATE 40

Female genitalia (*Olethreutes*)

FIG. 244. *Olethreutes polluxana* (McDunnough).
245. *Olethreutes cespitana* (Hübner).
246. *Olethreutes costimaculana* (Fernald).
247. *Olethreutes deprecatoria* Heinrich.
248. *Olethreutes glaciana* (Möschler).
249. *Olethreutes bipartitana* (Clemens).

PLATE 41

Female genitalia (*Olethreutes*)

FIG. 250. *Olethreutes devotana* Kearfott.
251. *Olethreutes mengelana* (Fernald).
252. *Olethreutes inquietana* (Walker).
253. *Olethreutes buckellana albidula* Heinrich.

PLATE 42

Female genitalia (*Olethreutes, Badebecia, Sciaphila*)

FIG. 254. *Olethreutes puncticostana* (Walker).
255. *Olethreutes nordeggana* (McDunnough).
256. *Badebecia urticana* (Hübner).
257. *Sciaphila duplex* (Walsingham).
258. *Olethreutes intermistana* (Clemens).

PLATE 43

Female genitalia (*Hedia*)

FIG. 259. *Hedia cyanana* (Murtfeldt).
260. *Hedia? lineana* (Fernald).
261. *Hedia chionosema* (Zeller).
262. *Hedia variegana* (Hübner).
263. *Hedia separatana* (Kearfott).
264. *Hedia ochroleucana* (Hübner).

PLATE 44

Female genitalia (*Aphania*)

FIG. 265. *Aphania capreana* (Hübner).
266. *Aphania removana* (Kearfott).
267. *Aphania frigidana* (Packard).
268. *Aphania deceptana* (Kearfott).

PLATE 45

Female genitalia (*Aphania*)

FIG. 269. *Aphania apateticana* (McDunnough).
270. *Aphania youngana* (McDunnough).
271. *Aphania infida* Heinrich.
272. *Aphania albeolana* (Zeller).

PLATE 46

Male genitalia (*Dichrorampha*)

FIG. 273. *Dichrorampha kana* (Busck).
274. *Dichrorampha capitana* (Busck).
275. *Dichrorampha britana* (Busck).
276. *Dichrorampha simulana* (Clemens).

PLATE 47

Male genitalia (*Dichrorampha*)

FIG. 277. *Dichrorampha bittana* (Busck).
278. *Dichrorampha banana* (Busck).
279. *Dichrorampha incanana* (Clemens).
280. *Dichrorampha leopardana* (Busck).
281. *Dichrorampha piperana* (Busck).
282. *Dichrorampha radicicolana* Walsingham.
283. *Dichrorampha sedatana* (Busck).

PLATE 48

Male genitalia (*Ricula, Satronia, Talponia, Ethelgoda, Sereda, Hemimene, Goditha*)

FIG. 284. *Ricula maculana* (Fernald).
285. *Satronia tantilla* Heinrich.
286. *Talponia plummeriana* (Busck).
287. *Ethelgoda texanana* (Walsingham).
288. *Sereda lautana* (Clemens).
289. *Hemimene paula* Heinrich.
290. *Hemimene signifera* Heinrich.
291. *Hemimene ocliferia* Heinrich.
292. *Hemimene felicitana* (Heinrich).
293. *Goditha bumeliana* Heinrich.

PLATE 49

Male genitalia (*Grapholitha*)

FIG. 294. *Grapholitha libertina* Heinrich.
295. *Grapholitha packardi* Zeller.
296. *Grapholitha prunivora* (Walsh).
297. *Grapholitha fana* (Kearfott).
298. *Grapholitha imitativa* Heinrich.
299. *Grapholitha cacruleana* Walsingham.
300. *Grapholitha lunatana* Walsingham.
301. *Grapholitha conversana* Walsingham.
302. *Grapholitha eclipsana* Zeller.
303. *Grapholitha vitrana* Walsingham.

PLATE 50

Male genitalia (*Grapholitha, Ofatulena*)

FIG. 304. *Grapholitha angleseana* (Kearfott).
305. *Grapholitha molesta* (Busck).
306. *Grapholitha interstinctana* (Clemens).
307. *Grapholitha tristrigana* (Clemens).
308. *Grapholitha lana* (Kearfott).
309. *Ofatulena duodecemstriata* (Walsingham).
310. *Ofatulena luminosa* Heinrich.

PLATE 51

Male genitalia (*Laspeyresia*)

FIG. 311. *Laspeyresia bracteatana* (Fernald).
312. *Laspeyresia bracteatana* (Fernald). (=*pallidibasalis.*)
313. *Laspeyresia garacana* (Kearfott).
314. *Laspeyresia rana* Forbes.
315. *Laspeyresia ingrata* Heinrich.
316. *Laspeyresia larimana* (Walsingham).
317. *Laspeyresia laricana* Busck.

PLATE 52

Male genitalia (*Laspeyresia*)

FIG. 318. *Laspeyresia multilineana* (Kearfott).
319. *Laspeyresia populana* Busck.
320. *Laspeyresia grandicula* Heinrich.
321. *Laspeyresia fletcherana* (Kearfott).

PLATE 53

Male genitalia (*Laspeyresia*)

FIG. 322. *Laspeyresia memborsa* Heinrich.
323. *Laspeyresia caryana* (Fitch).
324. *Laspeyresia prosperana* (Kearfott).
325. *Laspeyresia candana* Forbes.

PLATE 54

Male genitalia (*Laspeyresia, Carpocapsa*)

FIG. 326. *Laspeyresia cupressana* (Kearfott).
327. *Laspeyresia tana* (Kearfott).
328. *Laspeyresia nigricana* (Stephens).
329. *Carpocapsa pomonella* (Linnaeus).

PLATE 55

Male genitalia (*Laspeyresia, Hedulia*)

FIG. 330. *Laspeyresia youngana* (Kearfott).
331. *Laspeyresia gallaesaliciana* (Riley).
332. *Laspeyresia leucobasis* Busck.
333. *Laspeyresia piperana* (Kearfott).
334. *Hedulia injectiva* Heinrich.

PLATE 56

Male genitalia (*Laspeyresia*)

FIG. 335. *Laspeyresia ninana* (Dyar).
336. *Laspeyresia americana* (Walsingham).
337. *Laspeyresia colorana* (Kearfott).

PLATE 57

Male genitalia (*Laspeyresia, Ecdytolopha, Gymnandrosoma*)

FIG. 338. *Laspeyresia erotella* (Heinrich).
339. *Ecdytolopha islandana* (Kearfott).
340. *Ecdytolopha insiticiana* Zeller.
341. *Gymnandrosoma punctidiscanum* Dyar.

PLATE 58

Male genitalia (*Bactra, Endothenia*)

FIG. 342. *Bactra lanceolana* (Hübner).
343. *Bactra furfurana* (Haworth).
344. *Bactra maiorina* Heinrich.
345. *Bactra priapeia* Heinrich.
346. *Bactra verutana* Zeller (typical).
347. *Bactra verutana albipuncta* Heinrich.
348. *Bactra verutana chrysea* Heinrich.
349. *Endothenia montanana* (Kearfott).

PLATE 59

Male genitalia (*Endothenia*)

FIG. 350. *Endothenia hebesana* (Walker).
351. *Endothenia daeckeana* (Kearfott).
352. *Endothenia sordulenta* Heinrich.
353. *Endothenia melanosticta* (Walsingham).
354. *Endothenia conditana* (Walsingham).
355. *Endothenia infuscata* Heinrich.
356. *Endothenia rubipuncta* (Kearfott).
357. *Endothenia antiquana nubilana* (Clemens).

PLATE 60

Male genitalia (*Polychrosis*)

FIG. 358. *Polychrosis botrana* (Schiffermüller).
359. *Polychrosis slingerlandana* Kearfott.
360. *Polychrosis spiraeifoliana* Heinrich.
361. *Polychrosis liriodendrana* Kearfott.
362. *Polychrosis viteana* (Clemens).
363. *Polychrosis carduana* Busck.
364. *Polychrosis cyclopiana* Heinrich.

PLATE 61

Male genitalia (*Polychrosis*)

FIG. 365. *Polychrosis aruncana* Kearfott.
366. *Polychrosis monotropana* Heinrich.
367. *Polychrosis cypripediana* Forbes.
368. *Polychrosis blandula* Heinrich.
369. *Polychrosis aemulana* Heinrich.
370. *Polychrosis yarakana* Kearfott.
371. *Polychrosis vernoniana* Kearfott.
372. *Polychrosis rhoifructana* Kearfoot.

PLATE 62

Male genitalia (*Aphania*)

FIG. 373. *Aphania deceptana* (Kearfott); aedoeagus and anellus omitted.
374. *Aphania youngana* (McDunnough).
375. *Aphania capreana* (Hübner).

PLATE 63

Male genitalia (*Aphania*)

FIG. 376. *Aphania frigidana* (Packard).
377. *Aphania tertiana* (McDunnough).
378. *Aphania afflicticia* Heinrich.

PLATE 64

Male genitalia (*Aphania*)

FIG. 379. *Aphania apateticana* (McDunnough).
380. *Aphania infida* Heinrich.
381. *Aphania removana* (Kearfott).

PLATE 65

Male genitalia (*Aphania*)

FIG. 382. *Aphania strigosa* Heinrich.
383. *Aphania albeolana* (Zeller).
384. *Aphania dextrana* (McDunnough).

PLATE 66

Male genitalia (*Ahmosia, Sciaphila, Hulda, Taniva, Loxoterma, Badebecia*)

FIG. 385. *Ahmosia aspasiana* (McDunnough).
386. *Ahmosia galbinea* Heinrich.
387. *Sciaphila duplex* (Walsingham).
388. *Hulda impudens* (Walsingham).
389. *Taniva albolineana* (Kearfott).
390. *Loxoterma latifasciana* (Haworth).
391. *Badebecia urticana* (Hübner).

PLATE 67

Male genitalia (*Episimus, Phaecasiophora, Cymolomia, Eccopsis*)

FIG. 392. *Episimus argutanus* (Clemens).
393. *Episimus augmentanus* (Zeller).
394. *Phaecasiophora confixana* (Walker).
395. *Phaecasiophora niveiguttana* Grote.
396. *Cymolomia hartigiana* (Ratzeburg).
397. *Eccopsis wahlbergiana* Zeller.

PLATE 68

Male genitalia (*Exartema*)

FIG. 398. *Exartema tilianum* Heinrich.
399. *Exartema nitidanum* (Clemens).
400. *Exartema olivaceanum* (Fernald).
401. *Exartema punctanum* (Walsingham).

PLATE 69

Male genitalia (*Exartema*)

FIG. 402. *Exartema appendiceum* Zeller.
403. *Exartema concinnanum* (Clemens).
404. *Exartema fasciatanum* Clemens.
405. *Exartema troglodanum* McDunnough.
406. *Exartema exacresimum* Heinrich.
407. *Exartema ferriferanum* (Walker).

PLATE 70

Male genitalia (*Zomaria, Evora, Tia, Eumarozia, Esia, Hedia*)

FIG. 408. *Zomaria interruptolineana* (Fernald).
409. *Zomaria rosaochreana* (Kearfott).
410. *Zomaria andromedana* (Barnes and McDunnough).
411. *Evora hemidesma* (Zeller).
412. *Tia vulgana* (McDunnough).
413. *Eumerozia malachitana* (Zeller).
414. *Esia approximana* (Heinrich).
415. *Hedia cyanana* (Murtfeldt).

PLATE 71

Male genitalia (*Hedia, Olethreutes*)

FIG. 416. *Hedia separatana* (Kearfott).
417. *Hedia ochroleucana* (Hübner).
418. *Hedia variegana* (Hübner).
419. *Hedia chinosema* (Zeller).
420. *Olethreutes devotana* Kearfott.
421. *Olethreutes costimaculana* (Fernald).

PLATE 72

Male genitalia (*Olethreutes*)

FIG. 422. *Olethreutes griseoalbana* (Walsingham).
423. *Olethreutes osmundana* (Fernald).
424. *Olethreutes aurieapitana* (Walsingham).
425. *Olethreutes albiciliana* (Fernald).
426. *Olethreutes siderana* (Treitschke); European specimen.
427. *Olethreutes siderana chalybeana* (Walsingham).

PLATE 73

Male genitalia (*Olethreutes*)

FIG. 428. *Olethreutes sordidana* (McDunnough).
429. *Olethreutes constellantana* (Zeller).
430. *Olethreutes coruscana* (Clemens).
431. *Olethreutes galaxana* Kearfott.
432. *Olethreutes glaciana* (Möschler).
433. *Olethreutes astrologana* (Zeller).

PLATE 74

Male genitalia (*Olethreutes*)

FIG. 434. *Olethreutes cespitana* (Hübner).
435. *Olethreutes bipartitana* (Clemens).
436. *Olethreutes deprecatoria* Heinrich.
437. *Olethreutes nordeggana* (McDunnough).
438. *Olethreutes carolana* (McDunnough).
439. *Olethreutes agilana* (Clemens).

PLATE 75

Male genitalia (*Olethreutes*)

FIG. 440. *Olethreutes schulziana* (Fabricius).
441. *Olethreutes intermistana* (Clemens).
442. *Olethreutes inquietana* (Walker).
443. *Olethreutes septentrionana* (Curtis) (=*fulvifrontana* Packard).
444. *Olethreutes punctieostana major* (Walsingham).
445. *Olethreutes polluxana* (McDunnough).

PLATE 76

Male genitalia (*Olethreutes*)

FIG. 446. *Olethreutes mengelana* (Fernald) (=*groenlandicana* Bang-Haas).
447. *Olethreutes bowmanana* (McDunnough).
448. *Olethreutes buckellana* (McDunnough).